

University of Waikato

# Lake Ecosystem Restoration New Zealand

## Global Lake Ecological Observatory Network

### GLEON 8 Meeting at the University of Waikato



For more information visit [www.gleon.org](http://www.gleon.org)

An international lakes group, known as GLEON (Global Lakes Ecological Observatory Network: [www.gleon.org](http://www.gleon.org)) held a workshop at the University of Waikato from 1st to 6th February 2009. This group uses high frequency lake data from local monitoring buoys (e.g. the Rotorua lakes) to develop a global network in which an international com-

munity participates in the analysis and interpretation of the data. The GLEON workshop group comprised 55 people from 17 different countries and represented a truly global group interested in environmental aspects of lakes.

The week culminated in a field trip to the Te Arawa lakes of Rotorua District on Waitangi Day where GLEON participants were hosted on Lake Rotoiti by the Lakes Water Quality Society. The visit to Rotorua provided an opportunity to showcase to them the Te Arawa lakes and, when visiting the Rotorua Museum, the scale model of these lakes. The conference was hosted by David Hamilton, with able assistance Louise Stewart, Dennis Trolle, Mat Allen, Deniz Özkundakci, Chris McBride and Lee Laboyrie. It was a great success, with workshops and presentations through the days followed by discussions over dinner. Mat Allan, Chris McBride and Koji Muraoka impressed the international audience, presenting some novel work in remote sensing, high-frequency monitoring buoys, and visualisation software to process buoy data, respectively.

## Fish & Rotifers

### Molecular fishing



Jonathan Banks, a geneticist with the Waikato University OBI

Richard Lobb (supervised by Jonathan Banks) has been working on using genetics to "bar-code" fish for his Waikato University summer research scholarship. The technique reads a short segment of a fish's

genome, the blueprint that determines the appearance of every living thing, to identify which fish species an individual belongs to (Knox et al. 2008). While identifying adult fish is relatively easy, juvenile fish can be extremely difficult to distinguish from their close relatives so the fish's genetic sequence gives a definite identification. Richard has used this technique to identify larval pest fish, and we are developing techniques that will identify fish from a small sample of lake water. This technique will lead to rapid assessment of fish populations and will help guide management of pest fish.

### Using rotifers for a new Trophic Level Index

Despite bioindicator techniques being commonplace for inferring stream water quality, lakes have largely been ignored. However, several Regional Councils have recently taken up the use of Ian Duggan's method of using rotifers to infer Trophic Level Index (TLI) values for their

lakes (Duggan et al. 2001, *Hydrobiologia* 446/447: 155-164). Bioindicator schemes rely on fewer samples needing collection than traditional methods, as species provide a reflection of environmental conditions through time. As such, the Regional Councils are finding the rotifer bioindicator particularly useful for inferring the trophic states of lakes that cannot be sampled regularly (Duggan, 2008). The technique is a score based system where common rotifer species are assigned a TLI value based on their occurrence and abundance across the trophic state gradient for lakes.



*Synchaeta*, a rotifer (X200)

## Summer Research Students

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We are on the web  
[www.LERNZ.CO.NZ](http://www.LERNZ.CO.NZ)

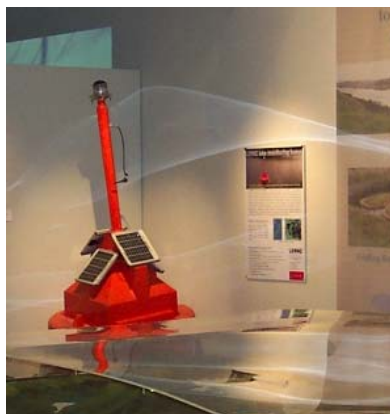


**Toni Johnston** recently completed her BSc at Waikato University and has been working under the supervision of Brendan Hicks as part of the summer scholarship programme. Toni has been investigating methods to improve the trapping efficiency of *Gambusia*. She has also been investigating the reliability of population estimates for *Gambusia* and the potential for control using collapsible bait traps. Her report is expected to be completed in early March. Toni will then commence her MSc investigating the effects of willows on fish and invertebrates in the Waikato River, supervised by Kevin Collier and Brendan Hicks.



**Kerry Barker** is a BSc student. She arrived in November to do three months of summer work for Nick Ling. She carried out experiments on pest fish species such as catfish, goldfish and rudd. These experiments involved injecting the fish with ovaprim (salmon gonadotrophin) to induce spawning and secretion of pheromones. The overall aim is to develop better catching methods, via chemical means, for these fish which pose a serious problem to New Zealand's waterways. The experiments involved taking tank water samples which were then filtered, with the pheromones present being trapped in solid phase extraction cartridges. It is hoped through this analysis that these pheromones and their structure will be identified, so that they can be eventually incorporated into fishing techniques that will help to remove pest fish.

## LERNZ helps contribute to He Korowai o te Wai at the Rotorua Museum



Scale model of the Rotorua Lakes (foreground) and a monitoring buoy (background) in Rotorua Museum of Art and History (photo by Louise Stewart)

The LERNZ group helped to contribute to He Korowai o te Wai, the Mantle of Water, which runs until April 2009 at the Rotorua Museum of Art and History. The exhibition features artworks and educational material related to water.

A 3 m by 2 m scale model of the Te Arawa lakes in the Rotorua region, as well as an area from Maketu Estuary to Tarawera River, was constructed with the assistance of the LERNZ group, for the purpose of the exhibition. It was sponsored primarily

by Environment Bay of Plenty, the Rotorua Council, the Lakes Water Quality Society and the Rotorua Museum, who also provided in-house support. The model was built by professional model maker Kelvin Way from Styrotech in Waimauku.

Louise Stewart spent considerable time on the logistics of organising the model builder, negotiating the contract, transporting the scale model and keeping the project on track in the face of a short deadline.

PhD student Mat Allan also made a major contribution to the project by supplying digitised schematics to model builder Styrotech for the initial routing and digitised landuse data. Mat also created and produced a video for the exhibition using Geographic Information System modelling. The video is a fly-through of the lakes area, taking viewers into the waters of lakes Rotorua and Rotoiti to show the bathymetry and the diversion wall in Lake Rotoiti (available on LERNZ website). Chris McBride also contributed a full-scale high-frequency monitoring buoy for the exhibition.

## Recent Publications

Daniel, A.J., Hicks, B. J., Ling, N., and David, B. 2009. Acoustic and radio transmitter retention in common carp (*Cyprinus carpio*) in New Zealand. *Marine and Freshwater Research*. In press. (copy: carpresearch@gmail.com)

Duggan, I. C. 2008. Zooplankton composition and a water quality assessment of seventeen Waikato lakes using rotifer community composition. Environment Waikato Technical Report 2008/26, Document #1323338. (copy: i.duggan@waikato.ac.nz)

Iversen, L., and Soenderbo, H. L. 2009. Predicting the effects of land use intensification and future climate change on two eutrophic New Zealand lakes with different mixing regimes. Centre for Biodiversity and Ecology Research, Department of Biological Sciences, School of Science and Engineering, The University of Waikato, Hamilton. (copy: <http://www.lernz.co.nz/publications/reports.shtml>)

Knox, M.A., B.J. Hicks, J.C. Banks, and I.D. Hogg. 2008. Fish bio-surveillance by genetic methods: a feasibility study. CBER Contract Report No. 90. Centre for Biodiversity and Ecology Research, Department of Biological Sciences, School of Science and Engineering, The University of Waikato, Hamilton. (copy: mak14@waikato.ac.nz)

Osborne, M. W., Ling, N., Hicks, B. J., and Tempero, G. W. 2009. Movement, social cohesion and site fidelity in adult koi carp, *Cyprinus carpio*. *Fisheries management and Ecology*. In press. (copy: b.hicks@waikato.ac.nz)

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 & Freshwater Research*, 59: 1067-1078. (copy: dennistrolle@gmail.com)

Trolle, D., Zhu, G., Hamilton, D.P., Lou, 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*. In press. (copy: dennistrolle@gmail.com)

Wood, S.A., Jentsch, K., Rueckert, A., Hamilton, D Cary, S.C. 2008. Hindcasting cyanobacterial communities in Lake Okaro with germination experiments and genetic analyses. *FEMS Microbiology Ecology*. 67:252-260. (copy: susie.wood@cawthron.org.nz)