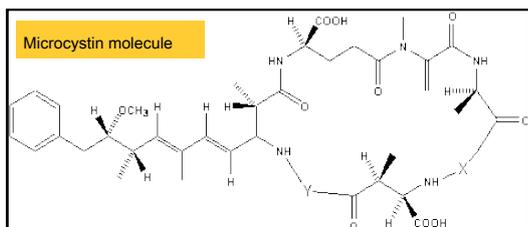




Development of molecular tools

Andreas Rueckert, from Craig Cary's lab, is developing molecular methods for assessment of cyanobacteria communities and aspects of cyanotoxin production. In collaboration with Susie Wood (Cawthron Institute), he established a culture-based inventory of more than 30 bloom-forming freshwater species in lakes of the Waikato and Rotorua districts. Susie and Andreas have also established a phylogenetic catalogue based on 16S rRNA gene cloning and sequencing for the molecular identification of cyanobacteria. ARISA, a DNA fingerprinting tool utilising the intergenic spacer region of the ribosomal genes is used for a snapshot assessment of cyanobacterial communities with potential to monitor for toxin production. Andreas has also developed several molecular assays targeting DNA and messenger RNA (i.e., quantitative PCR and RT-PCR) for the quantification of particular problematic species and their toxin transcripts. These techniques provide high throughput sample processing capability and offer opportunities for end users to make rapid assessments of cyanobacteria assemblages in lakes and rivers.

More recently, Andreas has been dedicated to resolving the decades-old conundrum of the biological function of cyanotoxins by studying microcystin gene regulation. The focus is on identifying the environmental trigger responsible for the initiation of microcystin gene transcription. Andreas' work is part of Intermediate Outcome 1 of the OBI.



Where are the buoys?

Chris McBride has installed another automated lake monitoring buoy, this time into a reservoir in Singapore. Chris has been working in conjunction with David Burger, one of David Hamilton's past Ph D students to make this happen. This is our second international installation with the other one in Lake Taihu, China. Buoys are now in lakes Rotorua, Rotoiti, and Tarawera and another is to go into Rotoehu in the Bay of Plenty. In the Waikato region, there is a buoy in Lake Ngāroto and there are two in Hawkes Bay, in Lakes Tutira and Waikaremoana. The benefit of remote monitoring is being able to collect and view data from your computer. Go to our real-time data page <http://www.lernz.co.nz/lake/realtimedata.html>



The automated monitoring buoy installed in a reservoir in Singapore.

Innovative trapping method



Automated carp feeder designed by Andrew Norris.



Andrew Norris with his carp trap net.

The prospect of an innovative trapping method has arisen through collaboration with Dr Andrew Norris of the Department of Primary Industry, Queensland. **Brendan,**

Nick, and **Dai** visited Andrew following his description of the method at the joint OBI-IACRC science meeting in 2009. Andrew and his team have developed a trap net with 25-m wings, which when used with an automated feeder draws carp to the trap. Andrew's experiments have shown that 200-300 carp can enter the trap in a 4-day interval.

Ecological integrity of deep lakes

Marc Schallenberg (University of Otago), Dave Kelly (DoC), Mary de Winton and Piet Verberg (NIWA), joined **Deniz Özkundakci** and **David Hamilton** to discuss the development of a metric of ecological condition in deep lakes in response to landscape-scale human pressure gradients. These pressures include land use cover - impervious area, indigenous vegetation removal, nitrogen and phosphorus loading predictions, interruptions in connectivity, and distributions of exotic species of fish and macroinvertebrates.

This project will ultimately provide information for indentifying Waters of National Importance (WONI) for tourism, irrigation, energy generation, industrial uses, recreation, natural heritage and cultural heritage.

Technician exchange

Warrick Powrie is on a technician exchange and is working at Inland Fisheries Services Tasmania for one month. He is learning more about tracking trout and carp using acoustic and radio tracking transmitters as well as fishery management. In exchange, Andrew Taylor is working within LERNZ. He has previously worked on analysis of GIS data collected on carp and trout movements from lakes Sorell and Crescent in the Tasmanian highlands.

Conferences

Brendan Hicks, Nick Ling, and Dai Morgan attended the annual meeting of Invasive Animals Cooperative Research Centre (IACRC) in Canberra. In contrast to the joint meeting of the IACRC and OBI in June 2009 in Hamilton, the Canberra meeting was a whole-of-programme review, covering invasive fish research as well as genetic identification of foxes and the latest poison bait formulations for pigs.

Chris McBride and **Mat Allan** attended the 10th GLEON meeting in Torres, Brazil. Mat presented a poster entitled *Validation of Landsat retrieved surface water temperature using GLEON buoy data* and Chris presented a paper called *Modelling lake response to land use change: improving model accuracy using high frequency buoy data*. Mat and Chris were funded through the Gordon and Betty Moore Foundation (USA).

Wendy Paul attended a freshwater phytoplankton taxonomy course in Scotland. She identified many species from the local lochs and rivers and shared samples from NZ lakes with others.

Visitors and arrivals

Associate Professor

Larelle Fabbro and her PhD student Sally Everson visited us from Central Queensland University. They worked on a joint project with Tamar Zohary (on sabbatical leave from Israel), Susie Wood (Cawthron Institute), Luciane Crossetti (Brazil) David Hamilton and Wendy



Susie Wood, Larelle Fabbro, Wendy Paul,
Tamar Zohary and Sally Everson

Paul. Their aim was to analyse data sets from Karori reservoir and Lake Okaro, New Zealand; Lake Kinneret, Israel; Lake Cobaki and Fitzroy River, Australia; and Lake Garcas, Brazil. They were looking for relationships between bloom events of cyanobacteria, the occurrence of heterocysts and dissolved inorganic nitrogen concentrations.

Ray Tana replaces Jeroen Brijs as research assistant for the invasive fish programme, until he starts his PhD studies. For his M Sc study, Ray assessed the population structure and spawning patterns of torrentfish (*Cheimarrichthys fosteri*) in two small Waikato Streams on Mt Pirongia and tracked their movements between fresh and seawater.

Allie E. Norse is doing a 10 week internship in ecological genetics in the PBRL lab at University of Waikato until 15 August. She comes from the University of West Florida, USA, where she is majoring in biology. The internship is through Australearn and Chapman University. The aim is to gain professional and experience, earn six study credits and have an international academic adventure. She is supervised by Dr. Jonathan Banks and supported by PhD candidate Philip Ross.

Honorary doctorate

Max Gibbs, a scientist with NIWA, has worked for many years on New Zealand's aquatic systems. He has helped many of our students with their projects and his name features on many of our publications as an author or in the acknowledgements. We are thrilled that Max has received an honorary doctorate from Waikato University in recognition of the valuable work that he does.



Max in his regalia

Recent Publications

- Collier, K.J., Hamilton, D.P., Vant, W., and Howard-Williams, C., 2010. *Waters of the Waikato: Ecology of New Zealand's Longest River*. Environment Waikato/University of Waikato, 292 pp.
- Hamilton, D.P., O'Brien, K.R., Burford, M.A., Brookes, J.D. and McBride, C.G. 2010. Vertical and horizontal distributions of chlorophyll fluorescence, irradiance and nutrients in deep monomictic lakes of varying trophic status. *Aquatic Sciences* 72: 295-307.
- Hamilton, D.P. and Duggan, I.C., 2010. Plankton. Chapter 7. In: *Waters of the Waikato: Ecology of New Zealand's Longest River*. K.J. Collier, D.P. Hamilton, W. Vant and C. Howard-Williams (Eds.) Environment Waikato/University of Waikato, pp. 117-132.
- Hamilton, D.P., Vant, W. and Neilson, K. 2010. Lowland lakes. Chapter 13. In: *Waters of the Waikato: Ecology of New Zealand's Longest River*. K.J. Collier, D.P. Hamilton, W. Vant and C. Howard-Williams (Eds.) Environment Waikato/University of Waikato, pp. 245-264.
- Hicks, B.J, Ling, N. and Wilson, B. 2010. Introduced fish. Chapter 11. In: *Waters of the Waikato: Ecology of New Zealand's Longest River*. K.J. Collier, D.P. Hamilton, W. Vant and C. Howard-Williams (Eds.) Environment Waikato/University of Waikato, pp. 209-228.
- Howard-Williams, C., Vant, W., Collier, K.J. and Hamilton, D.P. 2010. Synthesis and conclusions. Chapter 16. In: *Waters of the Waikato: Ecology of New Zealand's Longest River*. K.J. Collier, D.P. Hamilton, W. Vant and C. Howard-Williams (Eds.) Environment Waikato. Environment Waikato/University of Waikato, pp. 282-293.
- Kusabs, I. and Quinn, J. 2009. Use of a traditional Māori harvesting method, the tau kōura, for monitoring kōura (freshwater crayfish, *Paraneohrops planifrons*) in Lake Rotoiti, North Island, New Zealand. *N.Z. J. Mar. Freshwat. Res.* 43: 712-722.
- Ling, N. 2009. Management of invasive fish. In: *Invasive Species Management: A Handbook of Principles and Techniques* Clout, M.N. and Williams, P.A. (Eds). Oxford University Press. pp. 185-249 .
- Özkundakci, D., 2010. Speciation and dynamics of phosphorus in relation to lake restoration methods. Ph.D. thesis, Department of Biological Sciences, University of Waikato.
- Özkundakci, D., Hamilton, D.P. and Gibbs, M. 2010. Hypolimnetic phosphorus and nitrogen dynamics in a small, eutrophic lake with a seasonally anoxic hypolimnion. *Hydrobiologia* DOI:10.1007/s10750-010-0358-9
- Pouwels, A., Hamilton, D.P., Arzberger, P.W., Kratz, T.K. and Lin, F-P. 2009: Use of lake sensor data in student education. *Verhandlung Internationale Vereinigung de Limnologie* 30(5): 673-676.
- 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., Prentice, M.J., Smith, K. and Hamilton, D.P., 2010. Low dissolved inorganic nitrogen and increased heterocyte frequency: precursors to *Anabaena planktonica* blooms in a temperate, eutrophic reservoir. *Journal of Plankton Research*, doi:10.1093/plankt/fbq048.
- 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(2): 252-260.
- Zhang, C., 2010. High frequency monitoring and three-dimensional modelling of temporal variations in water quality of Lake Rotorua, New Zealand. M.Sc. thesis, Department of Biological Sciences, University of Waikato.