LERNZ
Lake Ecosystem Restoration New Zealand

University of Waikato

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Waters of the Waikato

Waters of the Waikato is a new book about the Waikato River which was launched on 20 August at Turangawaewae Marae as part of the coronation celebrations for Kingi Tuheitia. The Prime Minister, John Key, was in attendance. Scientists and other staff from NIWA, Environment Waikato (EW) and University of Waikato attended the launch. The book, which is aimed as a reference for researchers, river managers, students, policy makers and the wider community, can be purchased for $49 plus GST from the librarian at EW library@ew.govt.nz or www.ew.govt.nz/publications. Editors and authors from LERNZ who have been involved with the book include Kevin Collier (primary editor), David Hamilton, Ian Hogg, Brendan Hicks, Ian Duggan and Nick Ling.

Okere flood gates

As part of Environment Bay of Plenty's application for a resource consent for operation of the Okere flood gates, LERNZ was asked to model the implications of four different water level operational regimes in Lake Rotoiti. Kohji Muraoka capitalised on Nina Von Westerhagen's PhD research to make comparisons of the proportion of nutrient-enriched water from Lake Rotorua being transported from the Ohau Channel around the diversion wall and into Lake Rotoiti. Environment Bay of Plenty does not wish to see the effectiveness of the wall compromised as it is currently estimated to divert 98-100% of the water from Rotorua directly to the Kaituna River. Different water level regimes resulted in small variations in the amount of water entering Lake Rotoiti via the Ohau Channel. A regime with greater flexibility in water levels in Lake Rotoiti would produce the least intrusion of water from the Ohau Channel but the small amount of water entering Rotoiti suggests that other ecological effects should be carefully considered.

Okere flood gates (Photo: Environment Bay of Plenty)

The **LERNZ** group is now on **Facebook** if you would like to join. Type **LERNZ** into the search box.

Changes to leadership of LERNZ

Bruce Clarkson has recently taken up a position as Dean of the Faculty of Science and Engineering. After five years as Chief Science Officer of the OBI Bruce is now stepping aside and handing the reins to David Hamilton. Bruce is thanked for his tireless work in the conceptualisation and structuring of the OBI, and developing relationships with the funding provider, the Foundation for Research, Science and Technology. Deniz Özkundakci now steps into the role as leader of Intermediate Outcome 1 on Harmful Algal Blooms.

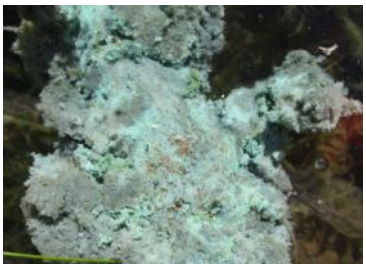
Lake Mangahia fish removal update

In April 2010 intensive fish removal was conducted at Lake Mangahia (a 10 ha peat lake just south of Temple View) in an attempt to get the biomass of pest fish down to <100kg/ha. The main pest fish at Mangahia were goldfish, catfish and rudd; although, a few koi carp were also detected. We used extensive fyke netting, boat electrofishing, and gill netting to remove a total of 3,084 goldfish (390 kg), 2,222 catfish (253 kg), 23 rudd (1.7 kg), 472 shortfin eels (183 kg), 20 longfin eels (28 kg) and 25 koi carp (10 kg). The capture of koi carp was surprising since they were not found during extensive preliminary work nor during the marking program. Prior to the removal event, fish were electrofished, marked (i.e., fin clipped), and then returned to the lake; by examining the proportion of marked to unmarked fish captured we were able to make population estimates of fish species in Lake Mangahia. Mark-recapture estimates suggested that before the removal, there were 4,878 catfish (46% of population removed), 24,361 goldfish (13% of population removed), 822 shortfin eels (57% of population removed) and 47 longfin eels (43% of population removed). Final population estimates for rudd (no marked fish returns) and koi (no koi were marked) were unable to be calculated. Native fish species (shortfin and longfin eels) were held in a holding area until the removal effort was completed then returned to the lake. Biomasses of the most abundant pest fish in Lake Mangahia were estimated to be around 3,083 kg (308 kg/ha) for goldfish and 556 kg (56 kg/ha) for catfish. This removal effort has shown that fyke netting and boat electrofishing were inadequate to take the biomass of goldfish down to <100kg/ha without considerably more effort. We will use seine netting and baited traps to further reduce pest fish abundance.

Annual Science Review Meeting

The Annual Science Review Meeting of LERNZ was held on 21 July, 2010 at the Academy of Performing Arts. The event was organised by Deniz Özkundakci and Jonathan Abell. An overview was given by David Hamilton then presentations on the intermediate outcomes (harmful algal blooms and pest fish) and related research areas (large rivers and urban restoration). Five minute presentations were given by students and staff on their latest research projects followed by breakout discussion sessions for each intermediate outcome.

Rotorua scum



Scum at the edge of Lake Rotorua.

An unusual cyanobacterial bloom occurred in Lake Rotorua in July. This bloom produced large teal-coloured masses that were up to 20 cm in diameter and had the consistency of cottage cheese. Concurrently there were masses of foam at the entrance to the Ohau Channel. The species constituting the bloom was *Microcystis wesenbergii*. This species has been observed only recently in the Rotorua lakes and has a mucilaginous sheath that probably contributed to the foaming as the scum broke down. *Microcystis wesenbergii* is potentially toxic but when checked at Cawthron Institute, did not register as being toxic. David Hamilton, Tamar Zohary and Wendy Paul were interviewed by National Radio whilst looking at the scum with a microscope. The interview is available at: http://podcast.radionz.co.nz/ocw/ocw-20100708-2106-Lake_Rotorua_Scum-048.mp3

Conferences

Nick Ling and **Grant Tempero** presented their research at the 9th International Congress for Biology of Fish in Spain. Nick then attended the British Isles Fisheries Society Conference in Belfast and later joined **Warrick Powrie** in Melbourne for the Australian Society of Fish Biology Conference.

Wendy Paul attended the 2nd National Cyanobacteria Workshop in Melbourne. Presentations can be accessed on http://www.wqra.com.au/conferences.htm

David Hamilton, **Deniz Özkundakci** and **Tamar Zohary** attended the 31st International Society of Limnology Congress in Capetown, South Africa.

Visitors and new people

Jo Simpson is our new Research Manager for the Outcome Based Investment. She comes from a science and business background, having an MSc in biochemistry and PGDip in business. She has moved from Auckland where she was a business manager at BNZ. Jo replaces Gary Whitehouse and is looking forward to meeting everyone.

Barbara Robson from CSIRO in Canberra, Australia, visited David Hamilton, to continue their collaboration on lake and estuary modelling. Barbara gave a seminar on modelling of production in the Daly River, in Northern Territory of Australia. Rivers in this area are some of the most ecologically intact in the world, but they are now coming under pressure as land and water resources are being developed in the region.

Courtney Kellock has arrived from University of British Columbia, Vancouver. She is on an internship for three months and she will work with Konrad Gorski on sampling inflows into the lower Waikato River.

Recent Publications

Allan, M.G., Hamilton, D.P., Hicks, B.J. and Brabyn, L. 2010: Landsat remote sensing of chlorophyll a concentrations in central North Island lakes of New Zealand. International Journal of Remote Sensing DOI: 10.1080/01431161003645840.

Abell, J.M., Özkundakci, D. and Hamilton, D. P. 2010: Nitrogen and phosphorus limitation of phytoplankton growth in New Zealand lakes: Implications for eutrophication control. Ecosystems DOI: 10.1007/s10021-010-9367-9.

Luo, L., Hamilton, D. P. and Han, B., 2010: Estimation of total cloud cover from solar radiation observations at Lake Rotorua, New Zealand. Solar Energy. 84 (3) 501-506.

Nishri, A. and Hamilton, D.P. 2010: A mass balance evaluation of the ecological significance of historical nitrogen fluxes in Lake Kinneret. Hydrobiologia DOI: 10.1007/s10750-010-0408-3.

Mooij, W.M., Trolle, D., Jeppesen, E., Arhonditsis, G., Belolipetsky, P.V., Chitamwebwa, D.B.R., Degermendzhy, A.G., DeAngelis, D.L., De Senerpont, Domis L.N., Downing, A.S., Elliott, J.A., Fragoso, Jr C.R., Gaedke, U., Genova, S.N., Gulati, R.D., Håkanson, L., Hamilton, D.P., Hipsey, M.R., 't Hoen, J., Hülsmann, S., Los, F.J., Makler-Pick, V., Petzoldt, T., Prokopkin, I.G., Rinke ,K., Schep, S.A., Tominaga, K., Van Dam, A.A., Van Nes ,E.H., Wells, S.A. and Janse, J.H. 2010: Challenges and opportunities for integrating lake ecosystem modelling approaches. Aquatic Ecology: doi:10.1007/s10452-010-9339-3.

Muraoka, K., Paul, W., Hamilton, D.P., von Westerhagen, N.2010. Effect of different operational regimes of Okere Gates on the effectiveness of the Ohau Channel diversion wall in Lake Rotoiti. CBER Contract Report 107.

Parkyn, S.; Collier, K.; David, B.; Davies-Colley, R.; Matheson, F.; Quinn, J.; Shaw, R.; Storey, R. 2010. The restoration indicator toolkit: Indicators for monitoring the ecological success of stream restoration. National Institute of Water & Atmospheric Research Ltd, Hamilton, New Zealand. 134 p.

Pearson, L.K., Hendy, C.K., Hamilton, D.P. and Pickett, R.C. 2010: Natural and anthropogenic lead in sediments of the Rotorua lakes, New Zealand. Earth and Planetary Science Letters DOI: 10.1016/j.epsl.2010.07.005.

Rueckert, A. and Cary, S.C. 2009. Use of an armored RNA standard to measure microcystin synthetase E gene expression in toxic Microcystis sp. by reverse-transcription QPCR. Limnology and Oceanography: Methods, 7:509-520.

Trolle, D., Hamilton, D.P. and Pilditch, C.A., 2010. Evaluating the influence of lake morphology, trophic status and diagenesis on geochemical profiles in lake sediments. Applied Geochemistry, doi:10.1016/j.apgeochem.2010.01.003.

Von Westernhagen, N., Hamilton, D.P. and Pilditch, C.A. 2010: Temporal and spatial variations in phytoplankton productivity in surface waters of a warm-temperate, monomictic lake in New Zealand. Hydrobiologia 652 (1): 57-70. DOI 10.1007/s10750-010-0318-4.

Wood, S.A., Rueckert, A., Hamilton, D.P., Cary, S.C. and Dietrich, D.R. 2010. Switching toxin production on and off: intermittent microcystin synthesis in a *Microcystis* bloom. Environmental Microbiology Reports. DOI:10.1111/j.1758-2229.2010.00196.x

Waikato River interview

Kevin Collier, and his students Michael Pingram, Toni Johnson, and Melany Ginders, were also recently interviewed by National Radio. They talked about their research into food-webs, effects of willows and riprap on invertebrates, fish and habitat and plankton communities in side-arms (hydraulic retention zones) in the Waikato River. This interview is available at: http://podcast.radionz.co.nz/ocw/ocw-20100812-2122-Waikato_River-048.mp3