

Lake Ecosystem Restoration New Zealand

Introducing the first **LERNZ** (Lake Ecosystem Restoration New Zealand) newsletter. **LERNZ** is a new research programme, which has attracted \$10 M in funding over the next 10 years from the Foundation of Research, Science and Technology.

What's in a name?

Our University of Waikato contract administrator, Gary Whitehouse, came up with the acronym 'LERNZ' to represent Lake Ecosystem Restoration New Zealand. While LERNZ initially has a focus on lakes in the Waikato and Rotorua regions, in the latter phases of the 10-year programme it will become increasingly national in coverage; we hope to provide tools and facilitate the research and actions of many others who are also working on lake restoration around New Zealand.

This newsletter aims to inform you about the research projects that contribute to LERNZ and their progress, introduce some of the researchers involved and outline the projects they are involved in, and advertise any seminars, lectures, workshops, and conferences pertaining to lake restoration.

There are two important **Intermediate Outcomes** of LERNZ. The first is **IO1: Harmful Algal Bloom Management for Lake Biodiversity Restoration**. The second is **IO2: Invasive Fish Management for Lake Biodiversity Restoration**.

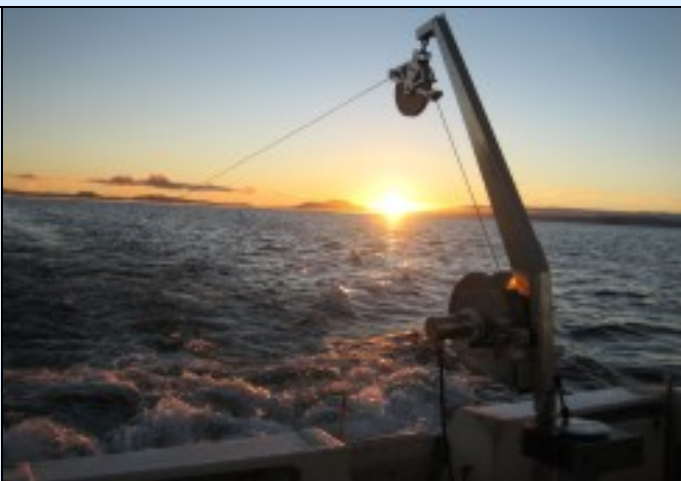
Both of these Intermediate Outcomes involve a suite of research projects conducted by staff and students from the University of Waikato and collaborators from SCION, IGNS, iQuest and HortResearch.

David Hamilton leads Intermediate Outcome 1 (IO1):

Harmful Algal Bloom Management for Lake Biodiversity Restoration. This research will provide a basis for actions to arrest the decline of lake biodiversity from harmful algal blooms (HABs) and eutrophication generally. It aims to understand critical aspects of the ecology of HABs in New Zealand, and use this knowledge to develop new tools and technologies for early detection and mitigation of HABs, and to plan scenarios to address future lake state. The key components of IO1 include genetic tools for identification of cyanobacteria (blue-green algae), model applications to address future land use and lake water quality scenarios, and examination of chemical treatments for nutrient inactivation. (d.hamilton@waikato.ac.nz)

Brendan Hicks leads Intermediate Outcome 2 (IO2):

Pest Fish Management for Lake Biodiversity Restoration. This research will develop methods that enable our end users to control pest fish populations. Increased understanding of the biology of pest fish in New Zealand will be used to develop new tools and technologies for early detection of pest fish incursions, and to control existing pest fish populations. The key components of IO2 include understanding dispersal mechanisms of pest fish, chemical control, developing genetic tools to improve biosurveillance, and predictive modelling of water bodies at risk from pest fish invasions. (b.hicks@waikato.ac.nz)



Biofish sampling early morning on Lake Taupo.

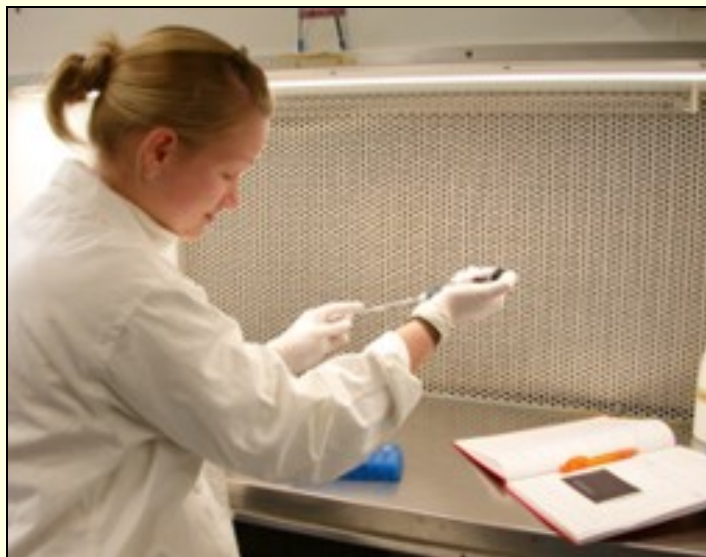
The first remote sensing water quality buoy is scheduled to be deployed in Lake Rotorua within the next few months. This buoy will transmit real time water temperature, fluorescence, dissolved oxygen, redox, pH, and chloride and nitrate ion data directly to the LERNZ website.

Project overview:

Genetic tools to assess cyanobacteria

Currently Craig Cary, David Hamilton, Katrin Jentzsch, Susie Wood, and Andreas Rueckert are developing genetic tools to assess cyanobacteria numbers, species, toxin production and evolution. These projects will aim to:

1. Identify and confirm planktonic cyanobacteria species responsible for toxin production in New Zealand waterbodies with molecular and chemical methods.
2. Develop and optimise rapid and sensitive molecular tools to detect and quantify toxic and non-toxic cyanobacteria present at low levels in waterbodies. These methods will allow high resolution sampling, increasing our ability to understand and predict cyanobacterial blooms and cyanotoxin production.
3. Use a suite of molecular tools to monitor changes in composition and dynamics of cyanobacterial species and assess changes in toxic and non-toxic genotypes in selected lakes. Changes in species and genotypes will be studied in relation to selected environmental parameters.
4. Investigate the influence of selected environmental parameters on transcription levels of genes that encode enzymes required for the synthesis of selected cyanotoxins.



Katrin Jentzsch is extracting cyanobacterial DNA from sediment cores taken in the Waikato and Rotorua regions. Katrin's research will provide us with information regarding the potential for cyanobacterial bloom formation from existing cells present in lake sediments.

Recent events:

Lake Waikare Community Information Day and Workshop 7th June

About 80 people attended this workshop held at Te Kauwhata. The Workshop was initiated by Aareka Hopkins, MSc student at Waikato University, and co-organised with Environment Waikato. Speakers from Environment Waikato, NIWA, Fish and Game, Victoria University and Waikato University gave presentations about various restoration issues. A powhiri to begin the seminars and a workshop at the conclusion of the presentations encouraged discussion between the community and scientific groups with an interest in Lake Waikare.

LERNZ website online August 2006

The LERNZ website is due to go live in August this year, and will include outlines of all the research projects and their progress, profiles of the researches, practical information on lake restoration, cyanobacterial species and toxin lists, upcoming events involving LERNZ, and the beginnings of a lake restoration database. The lake restoration database will link to existing databases constructed by NIWA, Environment Waikato and the Ministry for the Environment and should provide a historic record of lake attributes, restoration activities completed, restoration activities underway and future restoration objectives.

Recent Publications

Faithfull C., Hamilton D., Burger D. & Duggan I. (2006). *Waikato peat lakes sediment nutrient removal scoping exercise*. Environment Waikato Technical Report TR06/15.

Oezkundakci D. (2006). *Efficacy of sediment capping materials and flocculants for nutrient removal as a lake restoration technique*. BSc Dip Thesis.

Paul W. (2006). *Carbon and nitrogen transfers between phytoplankton and bacteria, and management of internal nutrient loads with alum in Lake Okaro, New Zealand*. MSc Thesis

Zheng L. (2006). *Use of steel industry slag aggregates for restoration of degraded lakes*. MSc Thesis.

