

OBI Year 8 Review

The Ministry of Business, Innovation and Employment has recently undertaken a review of the Outcome Based Investment (OBI) programme as part of the Fresh Water Multi Contract Review. Below are some brief excerpts of the LERNZ portfolio:

The OBI in Lake Biodiversity Restoration has delivered on all of its milestones, often far exceeding projections from the start of the contract. It has developed projects of national importance with key tools and models that contribute to managing the environmental quality of the freshwater environment and protecting and restoring aquatic biodiversity. Excellence has been demonstrated in terms of both science quality and end user engagement and uptake. The OBI has actively engaged with iwi and advanced Vision Mātauranga goals. The programme has produced techniques and knowledge that are strongly aligned with – indeed necessary for achieving – national directions indicated in the 2013 Freshwater Reform Documents released in March 2013 by the New Zealand government.

Specific areas where the research has been novel whilst also having immediate interest and uptake by end users include eDNA for pest fish incursion detection, synoptic remote sensing of water bodies, work on environmental triggers of toxin production, and hardware and software tools to facilitate high-frequency data collection using monitoring buoys designed by the OBI. These research outcomes are directly aligned with the vision of the OBI and the Key Performance Indicators that are used to assess its impacts and achievements.

The effectiveness of the OBI in achieving its impacts and objectives may also be assessed as follows:

- One peer reviewed scientific paper generated per \$21,476 of expenditure by MBIE
- Māori capacity building and practising examples of Mātauranga Māori in terms of education (4 MSc, 1 current PhD), engagement and knowledge transfer (29 hui)

- End user funded contracts signed since the 2008 Review are worth \$1,986,651, and help the OBI to achieve much more value for end users from the MBIE investment than would otherwise be possible
- Lake restoration research that crosses disciplinary boundaries and integrates social and economic contexts
- Spin-off benefits into other areas (e.g., agriculture, fisheries), new companies arising from OBI products and people, patents, and trained practitioners who then become skilled and knowledgeable end users.

Lake Horowhenua pest fish management

Using the team's considerable experience in assessing fish populations and developing methods for control, LERNZ is working with Horizons District Council to determine the relative abundance of the most common fish species within Lake Horowhenua. Lake Horowhenua is a small, shallow, eutrophic coastal dune lake on the west coast of the North Island. The lake has declined in ecological integrity in recent years through eutrophication and the introduction of exotic pest fish species. Pest fish management is of particular importance given that control and management of exotic invasive species have become a priority for regional councils around New Zealand as part of their obligations under various legislative acts.



Electrofishing on Lake Horowhenua

Multiple media releases were published surrounding the work:

<http://www.stuff.co.nz/dominion-post/news/local-papers/horowhenua-mail/8535569/Boffins-to-zap-lake-for-study>

<http://www.scoop.co.nz/stories/AK1304/S00552/pest-fish-monitoring-a-step-forward-for-lake-restoration.htm>

<http://www.stuff.co.nz/dominion-post/news/local-papers/horowhenua-mail/8587026/Nothing-fishy-going-on>

University of Waikato campus lake remediation

Professor David Hamilton is heading a project alongside the University of Waikato sustainability coordinator, Rachel Goddard, to clean-up of one of the University lakes. The project is of importance to the University of Waikato as the appearance of the lakes is integral to campus life for students, staff and visitors alike and enhance the campus' appeal.

However, the shallow lakes have silted up in the past 40 years and the project is thus focused on removing silt from Oranga Lake (the main lake).

Approximately 1600 cubic meters of sediment was pumped from Oranga Lake. Pest fish researchers removed 770 pest fish from the lake, including catfish, goldfish, koi carp and gambusia. One-hundred native short-fin eels were rescued from Oranga Lake and transferred to Knighton Lake. Subsequently, a pest fish barrier was installed under the footbridge between the lakes to prevent adult pest fish from entering Oranga Lake with another to be installed on the outlet of Knighton Lake.

The upcoming work involves alum dosing to improve water clarity and a community planting day in May when staff, students and the community will be invited to plant 1500-2000 native plants.



Oranga Lake at The University of Waikato

Welcome

LERNZ would like to welcome Nicole Gallina who joins the programme for a year from Switzerland. Nicole is funded through a fellowship awarded by the Swiss National Science Foundation to the most promising candidates in order to ensure academic and scientific continuity in Switzerland and enable them to improve their scientific training.

Farewells

Adam Daniel has recently moved on as leader of the LERNZ pest fish management project to take up a position of Fisheries Manager for Auckland/Waikato Fish and Game. We look forward to continuing our relationship with Adam in his new role where he can continue to support the LERNZ programme.

For more information go to www.lernz.co.nz

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Department of Biological Sciences, Science and Engineering, The University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand

Matt Knox has completed his PhD with LERNZ and is relocating with his family to Fort Collins, Colorado, to begin a post-doc position. Matt has been a valuable member of the team. We wish him good luck in his new position and country.

Recent Publications

Abell JM, Hamilton DP. (In press). Bioavailability of phosphorus transported during storm flow to a eutrophic, polymictic lake. *New Zealand Journal of Marine and Freshwater Research*. DOI:10.1080/00288330.2013.792851

Ashraf S, Brabyn L, Hicks B. (In press). Introducing contrast and luminance normalisation to improve the quality of subtractive resolution merge technique. *International Journal of Image and Data Fusion*. doi.org/10.1080/19479832.2013.782072.

Banks J, Demetras N, Hogg ID, Knox MA, West DW. (Submitted). Monitoring the eradication of brown trout (*Salmo trutta*) in a wildlife sanctuary using environmental DNA. *Canadian Journal of Zoology*. (cjj-2013-0065).

Blair JM, Hicks BJ, Pitkethley R, Ling N, Ostrovsky I, Rowe DK. 2013. A bioenergetic assessment of the influence of stocking practices on rainbow trout (*Oncorhynchus mykiss*) growth and consumption in a New Zealand lake. *Freshwater Biology* 58: 967–985. DOI:10.1111/fwb.12100.

Hamilton, D. P., McBride, C., Özkundakci, D., Schallenberg, M., Verburg, P., de Winton, M., Kelly, D., Hendy, C. and Ye, W. (2012) Effects of Climate Change on New Zealand Lakes, in *Climatic Change and Global Warming of Inland Waters: Impacts and Mitigation for Ecosystems and Societies* (eds C. R. Goldman, M. Kumagai and R. D. Robarts), John Wiley & Sons, Ltd, Chichester, UK. doi: 10.1002/9781118470596.ch19

Hicks BJ, Stichbury Glen A, Brabyn Lars K, Allan Mathew G, Ashraf S. 2013. Hindcasting water clarity from Landsat satellite images of unmonitored shallow lakes in the Waikato region, New Zealand. *Environmental Monitoring and Assessment*. DOI: 10.1007/s10661-013-3098-2.

Li W, Zhang C, Li Z, Liu J, Hicks B J, Zhang T. (online 26 Jan 2013). Effects of turbidity and light intensity on foraging success of juvenile mandarin fish *Siniperca chuatsi* (Basilewsky). *Environmental Biology of Fishes*. DOI: 10.1007/s10641-012-0096-0.

McDowell RM, Hamilton DP. (in press). Nutrients and eutrophication: introduction. *Marine and Freshwater Research* [Special Issue "Sources, sinks and fate of nutrients from agricultural catchments", Hamilton DP, McDowell RM (eds), 2013].

Pingram MA, Collier KJ, Hamilton DP, David BO, Hicks BJ. 2013 (2013). Carbon sources supporting large river food webs: a review of ecological theories and evidence from stable isotopes. *Freshwater Reviews* 5(2): 85-103. DOI: <http://dx.doi.org/10.1608/FRJ-5.2.476>.

Wood SA, Smith KF, Banks JC, Tremblay L, Rhodes L, Mountfort D, Cary CS, Pochon X. 2013. Molecular genetic tools for environmental monitoring of New Zealand's aquatic habitats, past, present and the future. *NZ Journal of Marine and Freshwater Research* 47 (1): 90-119. DOI: 10.1080/00288330.2012.745885.