

Freshwater

Win:win really is possible

Collaborative research is showing how land use changes can improve the economic as well as the environmental performance of a hill country farm. It's the product of cooperation between three Crown Research Institutes (NIWA, AgResearch, and Landcare Research), Tainui, the Department of Conservation, regional and district councils, and farmers.

The research takes place on a 296 hectare study farm, owned by Tainui, in the headwaters of the Mangaoatama catchment, near Whatawhata in the Waikato. In the late 1990s, the farm was struggling financially. The steep farmland was eroding. Stream habitat and water quality were degraded.

A catchment management group set the new direction for the farm, informed by extensive background research. It opted for conversion of the steepest land into pine plantation, some native planting especially along stream banks, and selective intensification of farming on the remaining land.

Five years later, we are seeing improved soil fertility, reduced pollutant loads in streams, improved stream habitat and biota, and improved plant diversity. Alongside this, the financial results have also been positive, with marked improvements in animal productivity.

The project is funded by the Foundation for Research, Science & Technology.



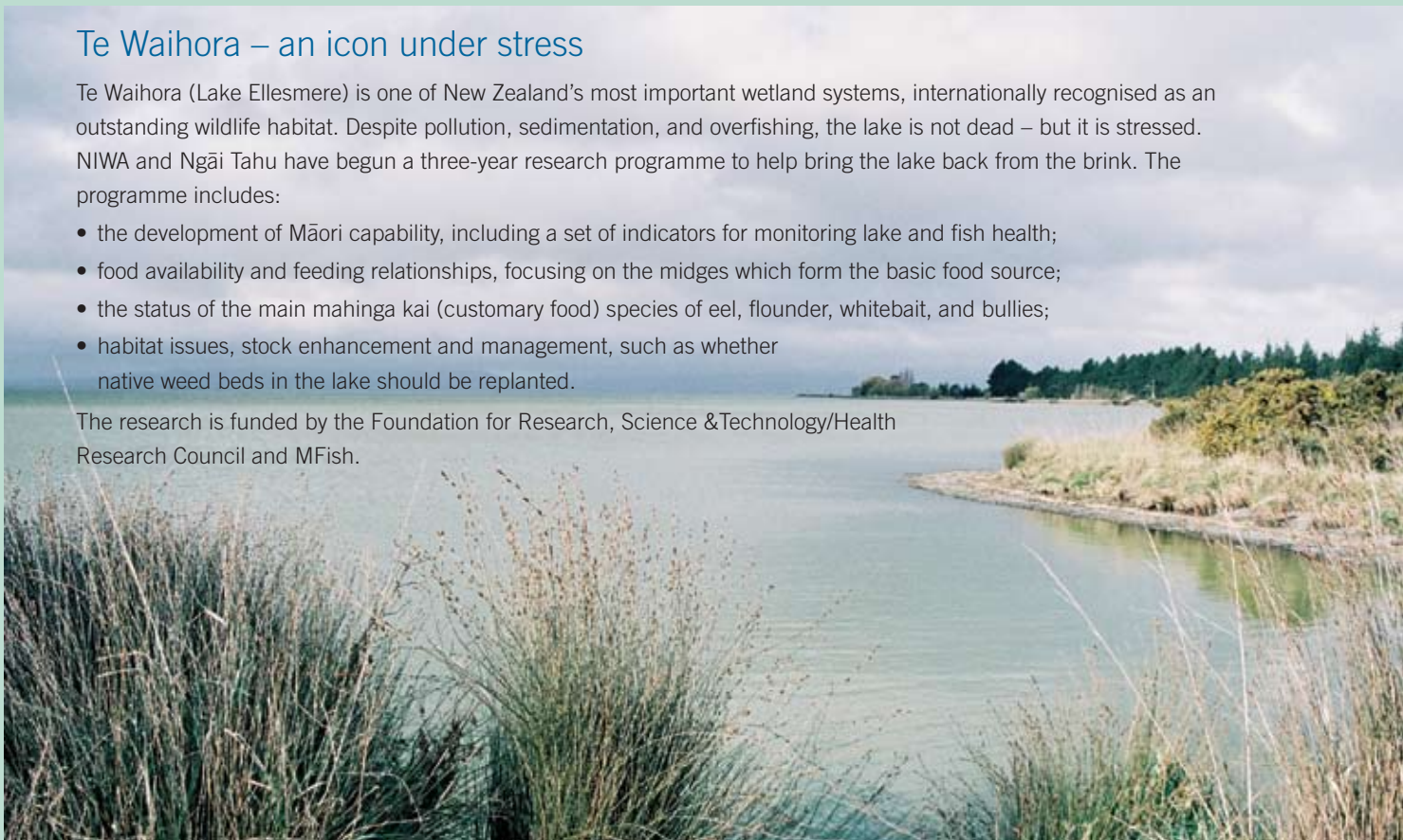
Experimental flow channels used to test the effects of various land uses on streams.

Te Waihora – an icon under stress

Te Waihora (Lake Ellesmere) is one of New Zealand's most important wetland systems, internationally recognised as an outstanding wildlife habitat. Despite pollution, sedimentation, and overfishing, the lake is not dead – but it is stressed. NIWA and Ngāi Tahu have begun a three-year research programme to help bring the lake back from the brink. The programme includes:

- the development of Māori capability, including a set of indicators for monitoring lake and fish health;
- food availability and feeding relationships, focusing on the midges which form the basic food source;
- the status of the main mahinga kai (customary food) species of eel, flounder, whitebait, and bullies;
- habitat issues, stock enhancement and management, such as whether native weed beds in the lake should be replanted.

The research is funded by the Foundation for Research, Science & Technology/Health Research Council and MFish.





Get the best from flushing flows

Floods are important in maintaining river channels and ecosystems. Dams generally prevent all but the largest floods from moving downstream, so dam operators sometimes create intentional floods or 'flushing flows'.

Flushing flows are costly in terms of lost power or irrigation potential so they need to be very precisely designed. NIWA researchers are studying 'flushes' of different sizes from the Opuha Dam, looking at the response of the downstream ecosystem.

So far, we have monitored small to moderate-sized floods, released from the dam after long periods without a flood. These flows were partially effective at removing large proliferations of algae, but did not cause substantial movement of the riverbed. Both these changes would improve the habitat for invertebrates which provide food for fish. The next experimental flushing flow will be much larger. Results will be of particular value to the irrigators, energy companies, and regional councils.

The research is funded by the Foundation for Research, Science & Technology and Alpine Energy Ltd.

Sampling invertebrates on algae-covered rocks.

CLUES to the big questions

If we allow large-scale conversion of forestry to dairying here, what would be the effect on water quality and on local living standards? It's a big question for regional resource planners. To answer it requires tools for predicting the cumulative effects of multiple nutrient and sediment inputs at a larger catchment scale, while also incorporating an economic and social dimension. No such tools existed in New Zealand until CLUES (Catchment Land Use for Environmental Sustainability).

A team of scientists led by NIWA, with input from AgResearch, HortResearch, Landcare Research, Aqualinc, and Harris Consulting, has spent the past three years developing CLUES. The project is sponsored by the Ministry of Agriculture & Forestry, with support from Environment Waikato.

The system currently has predictive models for nitrogen runoff linked to catchment and socioeconomic models, and supported by national landuse, climate, and soil databases. We are now working with regional and industry interests throughout the country to include phosphorus and sediment runoff, and to implement the system more widely.

