

# What is MTM?

**Manaaki Taha Moana (MTM)** is a research programme to restore and enhance coastal ecosystems and their services of importance to iwi/hapu, through a better knowledge of these ecosystems and the degradation processes that affect them.

We utilise Western Science and Mātauranga Maori knowledge and participatory modelling tools and processes to assist iwi/hapu to evaluate and define preferred options for enhancing/restoring coastal ecosystems. This evaluation of options is assisted by innovative IT and decision support tools (e.g. digital libraries, simulation modelling, interactive mapping, 3D depiction, real-time monitoring).

Action plans are being produced for improving coastal ecosystems in each rohe.

The research team works closely with iwi/hapu in the case study regions to develop tools and approaches to facilitate the uptake of this knowledge and its practical implementation.

Mechanisms will also be put in place to facilitate uptake amongst other iwi throughout NZ.



## Research Providers:

School of People Environment and Planning,  
Massey University

Taiao Raukawa Trust

Manaaki Te Awanui Trust

Waka Digital Ltd

Cawthron Institute

DOWNLOAD full copies of our FREE publications and other toolsets produced in this MBIE-funded research programme from our website:  
**[www.mtm.ac.nz](http://www.mtm.ac.nz)**

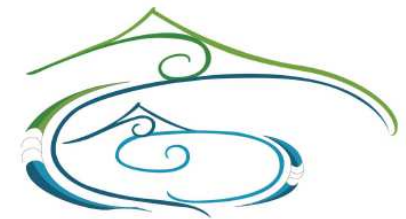


# MANAAKI TAHA MOANA: ENHANCING COASTAL ECOSYSTEMS FOR IWI

MTM Report No. 9



**WAIWIRI STREAM:**  
SOURCES OF POOR WATER QUALITY AND IMPACTS ON THE COASTAL ENVIRONMENT



RECOMMENDED CITATION: Allen C, Sinner J, Banks J, Doehring K 2012. Waiwiri Stream: Sources of Poor Water Quality and Impacts on the Coastal Environment. Manaaki Taha Moana Research Report No.9. Cawthron Report No. 2240. 48 p. plus appendices.

In close collaboration with local tangata whenua, Manaaki Taha Moana (MTM) selected the poor water quality in the Waiwiri Stream as a priority for investigation. MTM is a six-year research programme, funded by the Ministry of Business Innovation & Employment, which aims to assist iwi, hapū and whānau to maintain and enhance coastal ecosystems of cultural significance.

Revered in recent memory by kaumātua as an abundant food resource, the coastal foreshore adjacent to the mouth of the Waiwiri Stream once provided local hapū and kaitiaki with a plentiful supply of shellfish, including toheroa. This is no longer the case today. Anecdotal evidence suggests that the stream has suffered severe ecological degradation in the past 35 years, reflecting the cumulative effects of loss of riparian vegetation, sedimentation, and increased nutrient and faecal loading.

Waiwiri Stream is in many ways typical of lowland streams in the case study area. It flows out of a shallow dune lake through land that has been highly modified for pastoral agriculture and, in some cases, for forestry and residential development. Pastoral land use is known to lead to such effects in lowland rivers around New Zealand, and is therefore one of the probable causes in the Waiwiri Stream. However, mandated kaitiaki have also expressed concern about the possible contribution of human faecal matter from 'The Pot', an artificial pond built on an area of elevated sand dunes approximately 300 m from the stream. The unlined pond receives secondary treated effluent via a pipe from the Levin Wastewater Treatment Plant. From The Pot, effluent either seeps into groundwater or is spray-irrigated onto surrounding pine forest at a rate of up to 20,000 m<sup>3</sup> per day. Effluent will also disperse via evaporation.

This report attempts to assess the influence of two land use practices on water quality in the Waiwiri catchment: pastoral land use and human effluent input from The Pot. It looks for evidence of a longitudinal decline in water quality by first interpreting historical data, before narrowing the focus to look for the presence and likely source of faecal contaminants. Historical water quality data from the catchment were assessed with reference to national and regionally specific water quality guidelines, which assess the risk posed to either aquatic ecosystems or human health (e.g. ANZECC 2000).

Historical data indicates that Waiwiri Stream is in a poor state of health, with total phosphorus, ammoniacal nitrogen, total nitrogen, dissolved reactive phosphorus, carbonaceous biological oxygen demand and faecal coliforms all above guideline values. Between Lake Waiwiri and the coastal mouth of Waiwiri Stream there is a longitudinal decline in some water quality parameters (i.e. total coliforms, nitrate and total dissolved solids). Since these parameters are not source specific, the decline may be due to pastoral land use, human effluent input from The Pot, or avian sources.

Microbial source tracking (MST) was used to link faecal contamination with host organisms to identify the dominant source of faecal contamination and determine if human faecal matter enters the stream. From a cultural perspective, any faecal matter (particularly human) anywhere in the stream is offensive regardless of whether there is 'longitudinal decline'. The inability to manaaki (care for) guests with healthy, local delicacies at marae is a grave loss of mana or standing.

Non-host specific MST results indicate substantial faecal contamination in the stream as well as in shellfish collected at the mouth. High concentrations of ruminant faecal marker and the persistent presence of bovine faecal markers indicate that the dominant source of faecal contamination in the Waiwiri Stream is manure from cows. Ruminant marker concentrations were high at almost all stream sampling sites, but the highest densities were found in the stream, close to the point where it leaves the lake. Human markers were present in two of the 42 water tests and none of the six shellfish tests. These were found in water from a tributary that enters the stream from land surrounding The Pot. This indicates that water containing traces of human faecal matter, enters the Waiwiri Stream at this point. However, the evidence suggests that, relative to other sources, human sources are likely to be a minor contributor to faecal contamination in the stream.

Recommendations for restoration include:

- riparian fencing and planting
- improved management of effluent irrigation to land surrounding The Pot
- improvements to non-compliant agricultural practices
- continued management of populations of Canadian geese around the lake
- resumption of groundwater quality monitoring around The Pot.

This study has been carried out under the assumption that the health of shellfish populations at the stream mouth reflects water quality in the stream. It would be timely to investigate this further to see if shellfish abundance is affected by water quality in lowland streams and/or emergent groundwater.