

# Innovative solutions for water quality

**O**ur work in improving water quality in the Rotorua Te Arawa Lakes is world renowned, leading the way in lakes water quality management. Our Programme is supported by innovation, science and technology to develop our actions and approach. Some examples include:

## Aeration trials

We are trialling a new method in New Zealand to reduce the impact of nutrients that settle on the lakebeds.

Over the course of a year the changing water temperature of the lakes and lack of oxygen in the deep waters cause nutrients on the bottom of the lake to be released into the lake water. This can contribute to algal blooms in the lake. To reduce the impact of this we are trialling an aeration treatment in Lake Rotoehu.

This technique, adapted for specific Rotorua conditions, uses big air pumps to push air into the lower levels of the lake to mix up the water. This helps stop the release of nutrients from the lakebed. We are trialling this in Lake Rotoehu to work out how this innovative solution can be used in Lake Rotorua.

## Tikitere pilot plant

Lake Rotorua is unique, with 30 tonnes of nitrogen entering the lake every year from the Waiohewa Stream due to geothermal activity. A pilot plant was built in January 2011 to test the performance of removing the nitrogen from the stream before it enters the water. A major plant revamp occurred in the last year to solve sediment and pH issues in the incoming stream waters. If successful this will help remove a large portion of the 30 tonnes of nitrogen entering Lake Rotorua.

## Constructed floating wetlands

We are always looking for new approaches to reduce nutrients in the lakes. Last year two of the largest floating wetlands were constructed for Lake Rotorua and Lake Rotoehu to help reduce nitrogen in the lakes.

The Lake Rotorua wetland is about the size of one-and-a-half rugby fields and spells out "Rotorua" in giant floating letters. More than 20,000 native plants have been "sewn" into the constructed wetlands. It is these plants that will help remove the nutrients from the lakes.

## THE ROTORUA LAKES

Protection and Restoration Action Programme

For more information call 0800 884 880 or visit [www.boprc.govt.nz](http://www.boprc.govt.nz)



Lake Rotoiti



Tikitere pilot plant



Lake Rotorua floating wetland



Lake Rotorua floating wetland

## What's next?

The focus for the next 12 months includes:

- Develop rules and incentives to reduce nitrogen from the Lake Rotorua catchment
- Continue developing lake Action Plans
- Trial the use of locally mined Zeolite as an alternative option to remove nitrogen from geothermal sources for Lake Rotorua
- Test the de-nitrification treatment wall for Lake Rerewhakaaitu
- Complete Hamurana/Awahou sewerage reticulation

# Rotorua Te Arawa Lakes

Snapshot of progress 2011-2012



## Successes for 2011-2012

*Lake Rotorua's annual water quality is the best recorded since regular monitoring began in the 1990s.*

*Innovative solutions trialled in Lake Rotoehu.*

*Rotorua District Council completed an upgrade to the wastewater treatment plant.*

*Two of the largest constructed floating wetlands in the world established in Rotoehu and Rotorua.*

*Several sewerage schemes have been completed, reducing nutrients from lakeside communities.*

*Land use change agreement secured in the Rotoehu catchment removing four tonnes of nitrogen from entering Lake Rotoehu.*

**T**he Rotorua Te Arawa Lakes Protection and Restoration Programme is responsible for improving water quality in 12 Rotorua Lakes. Fantastic achievements were made in the last year to help improve and protect water quality in our lakes.

The Rotorua Te Arawa Lakes Protection and Restoration Programme is a \$200 million programme to protect and restore water quality in the Rotorua Te Arawa lakes. It is a partnership between Bay of Plenty Regional Council, Rotorua District Council and Te Arawa Lakes Trust. The Ministry for the Environment has committed \$72 million in a Deed of Funding arrangement to help fund water quality initiatives for the four priority lakes – Rotorua, Rotoiti, Rotoehu and Okareka.

## Water quality

Water quality is affected by the nutrients nitrogen and phosphorus entering the lakes from both natural and human activities. When nutrient levels in lakes are too high it can cause toxic algal blooms and aquatic weed growth. The Programme focuses on both treating the nutrients already in the lake as well as reducing the amount of nutrients entering the lakes.

Some of our actions have an immediate effect on water quality, such as weed harvesting. These actions provide a short-term solution. As soon as we stop these interventions we risk allowing water quality to decline again.

For long-term sustainable improvements changes are required to stop the nutrients entering the lake. It is important to realise these actions will not provide an immediate result and their effect on water quality will take time.

## The targets

We have set targets with the community for each lake to when people felt the quality of water was acceptable. Our targets are based on a water quality measure called the Trophic Level Index. Because many factors such as climate, the amount of rain and lake levels all play a part in affecting water quality, we need to look at the long-term trend of water quality in each lake.

## THE ROTORUA LAKES

Protection and Restoration Action Programme



Lake Rotoiti



# Rotorua Te Arawa Lakes water quality trend

## Lake Rotorua

Last year Lake Rotorua had the best water quality in decades, continuing the long-term trend of improving water quality. This result is primarily due to some great in-lake interventions and climate conditions.

Phosphorus has been greatly reduced through the two P-Locking Plants at Utuhina and Paurenga, treating the nutrient in the incoming streams before it gets to the lake.

While great achievements have been made for Lake Rotorua, the key to long-term sustainable water quality will be reducing nutrients from land use. A combination of rules and incentives to reduce nitrogen getting into the lake are in the early stages of development.



Kayaking on Lake Okareka

## Lake Okareka

The long-term trend for Lake Okareka shows water quality is stable.

Sewerage reticulation and a land use change agreement for 122 hectares have provided the nitrogen and phosphorus target reductions required.

It will take time to see these actions provide water quality improvements.

## Lake Tikitapu

All actions in the Action Plan have been completed, including sewerage reticulation. It will take time to see the improvements in water quality from these actions.

## Lake Rotokakahi

Water quality in Lake Rotokakahi is declining and an Action Plan for the lake will be developed with the lake owners.

## Lake Okaro

Water quality in Lake Okaro has fluctuated over the last 10 years and has improved as a result of our interventions.

All actions in the Action Plan have been completed. However recent algal blooms have led us to need to review the science and modelling work to understand the long-term changes that may occur in the lake.



## Lake Rotoehu

Great improvements to water quality in Lake Rotoehu have resulted in no health warnings issued during the last three summer seasons.

An Action Plan for the lake was implemented in 2008. For long-term sustainable water quality nutrient reductions from the catchment will be needed.

## Lake Rotoma

High lake levels saw a slight decline in water quality in the last year.

An Action Plan is being implemented.

## Lake Rotoiti

Water quality in Lake Rotoiti continues to improve.

The Ohau Diversion Wall and sewerage reticulation will deliver the necessary nitrogen and phosphorus reductions for the lake.

## Lake Okataina

Last year Lake Okataina had very high lake levels and increased run-off from rain which increased nutrient levels in the lake.

A draft Lake Okataina Action Plan has been released for public feedback.

## Lake Tarawera

Lake Tarawera's water quality is declining and the last year saw an increase in nutrient levels.

An Action Plan is being developed. We have met with the community several times to get their input and thoughts on how water quality can be improved in Lake Tarawera.

Further consultation is needed with iwi before the Action Plan can progress.

## Lake Rotomahana

Since 2005 the long-term water trend shows a decline in water quality, although Lake Rotomahana has not reached the trigger point to need an Action Plan. We will continue to monitor the lake and if this changes an Action Plan will be developed in consultation with the community.

## Lake Rerewhakaaitu

The Rerewhakaaitu community has banded together to take action for their lake. Since 2008 the local farmers have come together for an initiative called Project Rerewhakaaitu – a sustainable farming project of 25 farms reducing the amount of nitrogen entering the lake.



Lake Rotoma



Pure Cruise on Lake Rotoiti