



# FRESHWATER SUSTAINABILITY



# Freshwater sustainability: overview

Freshwater sustainability is about ensuring that Rotorua has access to clean water for drinking and other purposes such as commercial and recreational use. There are many challenges to protecting our freshwater resources, including the ongoing need to restore the water quality of the Rotorua Lakes. It is likely that the allocation of, and ongoing access to, freshwater resources will emerge as a key issue in the future.

The Freshwater sustainability theme consists of four environmental indicators that assess lake and stream health and recreational water quality.

## How are we going?

Changes to the ecological health of the environment are sometimes difficult to monitor over short periods, as some processes can take time. Environment Bay of Plenty sets ecological health targets in the Regional Water and Land Plan using a lake water quality measure called the Trophic Lake Index (TLI). TLI monitoring has been undertaken since 1990. Results show that TLI values have not altered significantly since they were reported in the 2002 State of Environment report. This steady state may be attributable to a 'lag period', which means that while changes in land management may be occurring now, it will be some time before their effects can be observed in the natural environment. What is important is that people are making plans and taking action now, so that the future health of the lakes is protected.

While the focus of improving water quality in Rotorua has been on lakes, it is important to also monitor and report the health of rivers and streams. Five Rotorua streams have shown a decrease in faecal counts. It is likely that this is because a number of property owners have fenced riparian areas to exclude stock access. A decrease in faecal counts at bathing sites also means the water is safer for recreational users.

## What are we doing?

Action plans for each of the priority lakes have been finalised or are being developed. Action plans are created by working parties that include members of the relevant community.

At the time of writing the Lake Rotorua/Rotoiti action plan was in the final stages of the

process to make it operative. The Lake Rotoehu action plan became operative in November 2007.

Lake Okareka's action plan is operative. One of the actions being implemented is the application of Phosloc to the lake to capture the 30 kilograms of phosphorus released annually from lake bed sediments.

Lake Okaro's action plan has been completed, a major component being the construction of a wetland that filters nutrients from surrounding farmland. The wetland is an example of what can be achieved and is a major step forward in the achievement of freshwater sustainability.





Both lakes Tarawera and Rotoma working parties are working towards action plans. Lakes Okataina and Tikitapu are yet to initiate working parties.

One of the biggest projects for the protection of lake water quality has been the construction of the wall at the Ohau Channel between Rotorua and Rotoiti. The wall is designed to prevent Lake Rotoiti from being a nutrient sink for water flowing out of Lake Rotorua.

The Council has also been working with communities to implement wastewater reticulation schemes for lakeside communities. Reticulation of wastewater not only contributes to lake health but also has human health benefits.



## Freshwater sustainability indicators are:

Indicator	State
Lake water quality trophic level index	 STEADY
Stream water quality	 STEADY
Protection of lake water quality	 GETTING BETTER
Bathing water quality	 GETTING BETTER

# Freshwater sustainability: lake water quality



## Indicator 1.1 Trophic level index

STEADY

### Purpose of indicator

Lake health is very important to Rotorua. The trophic level index (TLI) is used to calculate a value of lake water quality. TLI measures four parameters:

- Total nitrogen
- Total phosphorus (both nitrogen and phosphorus are nutrients)
- Water clarity
- Chlorophyll content (both water clarity and chlorophyll content are affected by the amount of algae present in the water)

Monitoring the TLI of a lake provides information about the rate that water quality is deteriorating or improving. Generally, the lower the TLI score the better the water quality. The TLI of each lake is shown in Table 1.1 along with its trophic state. The trophic state of a lake is determined by the TLI value. Figure 1.1 shows the spectrum of trophic states and illustrates how nutrients and fertility affect TLI and water clarity.



### Current information and trend

Environment Bay of Plenty has been monitoring the Rotorua Lakes since 1990. Table 1.1 shows the past three years of TLI monitoring results. Lake Okaro is the only lake to have made a 'definite improvement'.



Lakes Rotomahana, Rerewhakaaitu, Okareka, Tarawera and Rotoma have all experienced 'no change' in their condition.



Lakes Rotorua and Rotoehu have experienced some degradation but not enough to warrant a 'change'. Lake Rotoiti's TLI trend shows definite degradation.

The data in Table 1.1 is part of a general trend indicating that there has not been much change in the last seven years. Due to the nature of lakes and their ecological systems it is a slow process to see any positive or negative change, and quite often there is a lag period between an event or action and its effects in the ecosystem.

Table 1.1 Rotorua lakes trophic level index monitoring

Lake	Lake type based on Trophic Level	TLI Target	3 yr average TLI to 2006	Long Term Trend
Okaro	Supertrophic	5.0	5.6	Definite Improvement
Rotorua	Eutrophic	4.2	4.9	Degraded, No change
Rotoehu	Eutrophic	3.9	4.6	Degraded, No change
Rotoiti	Eutrophic	3.5	4.4	Definite degradation
Rotomahana	Mesotrophic	3.9	3.9	No Change
Rerewhakaaitu	Mesotrophic	3.6	3.5	No Change
Okareka	Mesotrophic	3.0	3.4	No Change
Rotokakahi	Mesotrophic	3.1	3.4	Not applicable
Rotoma	Oligotrophic	2.3	2.5	No Change
Tikitapu	Oligotrophic	2.7	3.1	Probable degradation
Okataina	Oligotrophic	2.6	2.9	Possible degradation
Tarawera	Oligotrophic	2.6	2.8	No Change

Source: Environment Bay of Plenty, Rotorua Lake Water Quality 2006

### What the community said

The community considered the best water quality to be in Lakes Tarawera, Rotokakahi (Green Lake), Okataina and Tikitapu (Blue Lake). Lakes Rotoiti and Rotorua were perceived to have the worst.

