



Proud Partners



## Effects of Ohau Diversion Wall on fishery

The research findings have shown overall that:

- To date koura and kakahi remain abundant in the Okere Arm and Lake Rotoiti.
- The Lake Rotoiti trout population has generally changed little since the wall was installed, either in fish size or the wild component of the catch.
- The Ohau Channel fishery has had some poor years after the wall was finished but also one very good year of fishing during the second season after the wall was installed.

## Additional research undertaken

Going above and beyond the requirements of the resource consent for the Diversion Wall, the Bay of Plenty Regional Council has funded a PhD study, carried out by Jennifer Blair at the University of Waikato, examining the factors controlling rainbow trout growth in the Rotorua lakes. This research found that highest trout growth rates are found in deeper, cooler lakes with better water quality. A bioenergetics study showed that stocking strategies need to be tailored to our unique New Zealand conditions, and that Fish & Game can optimise trout growth by adjusting stocking rates and timing.

This work has already resulted in some changes to the way Fish & Game release trout into Lake Rotoiti to coincide with the available food source and promote potentially higher growth rates.

## Improvements to Lake Rotoiti water quality

Water quality in Lake Rotoiti is improving. Prior to the wall being constructed Lake Rotoiti was closed due to health warnings on average 17 weeks per year between 2000 and 2007. This has reduced to 5 weeks per year since construction of the wall.

## What's next?

At the end of the five years the results and analysis of the monitoring and research will be presented to the Fishery Advisory.

This information will be used to assess the impact the diversion wall may have had on the fisheries in Lake Rotoiti over the five year period and whether any mitigation actions need to be taken.

# LAKE ROTOITI Fish Monitoring PROGRAMME



***The Rotorua Te Arawa Lakes Programme has the task of improving water quality in 12 lakes. The Ohau Diversion Wall was constructed in 2008 to improve water quality in Lake Rotoiti.***

The Fish Monitoring Programme was established to determine if the Ohau Diversion Wall has an impact on fisheries in Lakes Rotorua and Rotoiti. This programme has the task to research and monitor the long-term effect of the diversion wall on smelt, trout, koura and kakahi.

The resource consent for the wall has a specific monitoring condition that requires fisheries monitoring for a period of five years to determine whether the wall is impacting the fishery within the two lakes. An external and independent Fishery Advisory Panel meets annually, consisting of scientists from the Department of Conservation, University of Otago and independent fishery experts. This group reviews and monitors advice from a range of independent advisory bodies including NIWA, University of Waikato and Fish & Game.

## Ohau Diversion Wall

Seventy percent of the nutrients reaching Lake Rotoiti came from Lake Rotorua via the Ohau Channel. To improve water quality in Lake Rotoiti it was necessary to prevent these nutrient rich waters reaching the lake. The Ohau Diversion Wall stops nutrient rich waters entering Lake Rotoiti. So far this action has been successful in protecting the water quality of Lake Rotoiti.



## Wall facts

The wall is a sheet pile wall 1300 metres long attached to the lake bed with king piles up to 70 metres deep. It has a low profile which extends 500 millimetres above the water surface so it is not visually intrusive. Construction of the wall was completed in June 2008.

The Resource Consent for the Ohau Diversion Wall is for 12 years. The expected lifespan of the constructed wall is more than 50 years.



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# LAKE ROTOITI Fish Monitoring PROGRAMME



## Fishery research findings to date

Research and monitoring of the fisheries in Lake Rotoiti began at least two years prior to the construction of the wall. We have four years of research and findings since completion of the wall.

### Smelt

*Smelt are small bony freshwater fish that trout feed on. Smelt studies have involved trapping the seasonal runs of smelt through Ohau Channel, drop netting and acoustic surveying in Lake Rotoiti and studying the origin and movement of smelt between lakes using micro-chemistry of their ear bones (otoliths).*



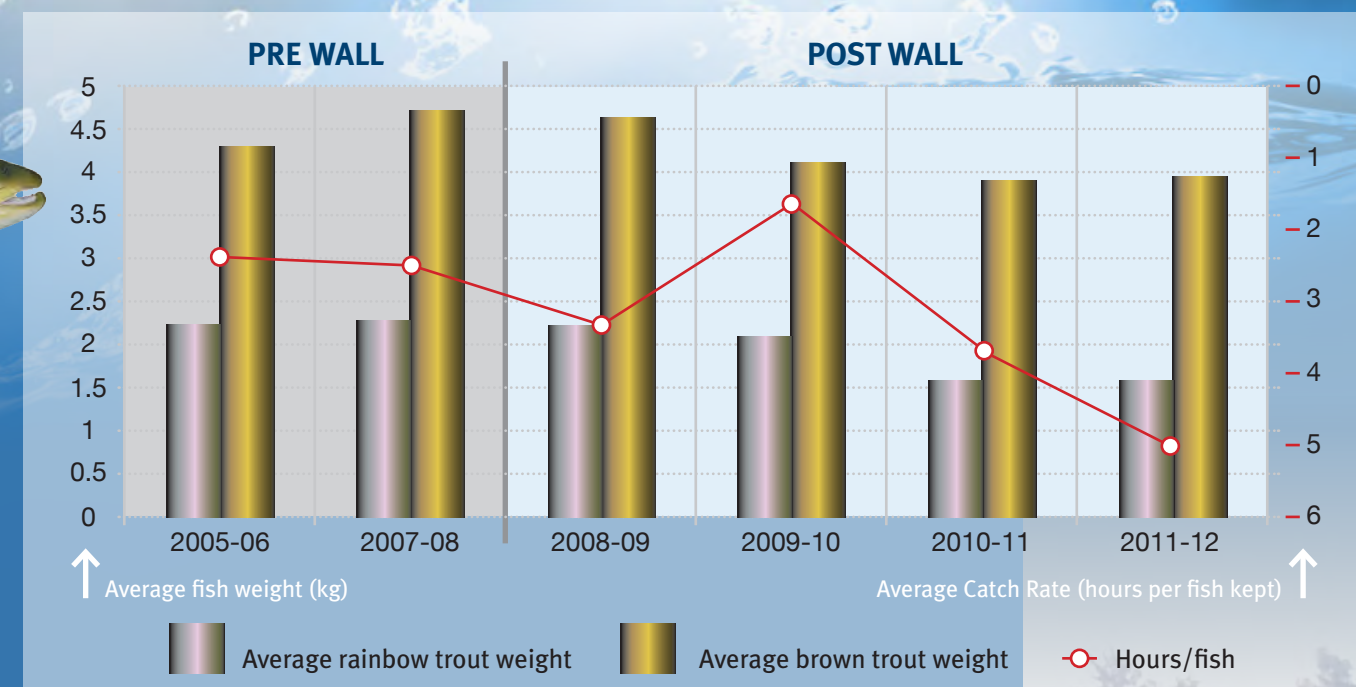
- Monitoring results indicate that the diversion wall has had no negative impact on either adult or juvenile smelt populations in Lake Rotoiti to date.
- Trapping of smelt runs in the Ohau Channel have shown the wall is not a physical barrier to the movement of juvenile and adult smelt – they can still migrate up the Ohau Channel from Lake Rotoiti.
- Runs of smelt have occurred up the channel since the wall was constructed
- The effect of the wall on the frequency and size of smelt runs is unknown. At this stage there is no indication that smelt runs have any relationship to temperature or flow changes. Trap catches of smelt pre and post wall are very similar.
- As water quality continues to improve in Lake Rotoiti, larval smelt and the number of smelt in the lake are expected to increase due to the positive relationship between larval smelt density and improved lake water clarity.

### Trout

*Trout findings are based on Angler surveys and fish catch measurements in Lake Rotoiti, Lake Rotorua and the Ohau Channel*

- The Lake Rotoiti trout fishery has changed little since the wall was completed. Trout growth has remained relatively steady although in the last year young trout growth has been low.
- The number of fish released into Lake Rotoiti has increased to account for increased angler pressure and this may be the cause of the recent drop in young fish growth. Fish growth for the immediate three seasons after the wall was completed was better than average.
- The proportion of wild fish in the Lake Rotoiti catch is on the low side of the long-term data collected, but trout otolith work shows that both adult and juvenile trout are continuing to move between Lakes Rotoiti and Rotorua around the wall.
- Angler surveys have shown that fishing in the channel has been poor for three seasons after the wall was completed but also very good in the second season after the wall was finished.
- For anglers fishing in the Ohau Channel their perception of catch rate, fish size and satisfaction has declined since the diversion wall was constructed.

## Ohau Channel angler surveys, fish size and catch rate



- Since the construction of the wall the area known as the 'Delta' has changed and become a poor angling area. Anglers have needed to change their fishing locations and extra pressure has since been placed on the Lake Rotorua end of the channel.
- Lake Rotorua surveys have shown a drop in condition of rainbow trout since the 2007-08 season when the wall was constructed. There have been seasons before the wall was built that trout condition factors were low. This was due to warmer summer temperatures and algal blooms. However recent water quality in Lake Rotorua has been very good and this should mean more smelt growth in Rotorua compared to previous years when there has been strong autumn algal blooms.

### Koura - Freshwater crayfish

*Koura monitoring sites included Okere Arm, Te Akau and Manupirua Hotpools.*

- Koura are still abundant in the Okere Arm and Lake Rotoiti.
- There has been a significant decline in koura abundance and yield at Okere. However, there has also been a significant decline in koura abundance at Te Akau and a decline (not significant) in koura abundance at Manupirua Hotpools, both sites are situated outside the diversion wall. The decline in koura abundance at Te Akau and Manupirua Hotpools may be due to the inundation of the lake bed with large amounts of dislodged hornwort – a result of improved water clarity. The reasons for the decline in the abundance and yield in the Okere Arm are unknown.

### Kakahi - Freshwater mussels

*Kakahi monitoring took place in six locations – three sites within the diversion wall and three sites in Lake Rotoiti.*

- Kakahi remain abundant in the Okere Arm and Lake Rotoiti.
- In the three Okere Arm sites, there has been a significant increase, a significant decrease and no change in kakahi abundance.
- The fine silt that has accumulated in the Okere Arm since the wall was constructed has been colonised by extensive growths of low growing turf plants. This has resulted in a more suitable habitat for kakahi.
- The Okere Arm is a dynamic environment and future changes in kakahi abundance are expected.



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