ROTORUA TE ARAWA LAKES ANNUAL REPORT

2011/2012

THE ROTORUA LAKES
Protection and Restoration Action Programme

A **Bay of Plenty Regional Council, Rotorua District Council** and **Te Arawa Lakes Trust** joint project

1 Purpose

The purpose of this report is to present the lakes restoration programme and expenditure for the 2011/2012 financial year to the Rotorua Te Arawa Lakes Strategy Group (RTALSG). The report covers all operation, policy and support work undertaken as well as, in lake water quality results and cumulative progress towards Deed of Funding outcomes. Information is provided for both Deed funded and non-deed funded Lakes.

2 Introduction

The Rotorua Te Arawa Lakes Protection and Restoration Programme had another successful year in 2011/2012 with significant progress being made towards the restoration and protection of the Rotorua Te Arawa Lakes. Contributing to the successful implementation has been working in a collaborative partnership within the Rotorua Te Arawa Strategy Group.

The Deed of Funding contributions from the Crown have ensured continued progress for the four priority Lakes. These funds went a long way to reducing nitrogen and phosphorus and in some instances have resulted in significant water quality improvements.

A more flexible Deed of Funding was approved by Cabinet, which focused the programme on outcomes achieved instead of predetermined actions. This enforces the principles of adaptive management, which are a key provision in the Memorandum of Understanding between the Crown and the Strategy partners. Further to the outcomes-focused Deed was an audit of the programme delivery, ensuring continued improvement in programme delivery.

To ensure most efficient and effective use of resources, advice and support was sought from the University of Waikato Chair in Lakes Science, as well as the Technical Advisory Group for lakes science.

Further planning and scientific research is progressing on other lesser funded lakes; additional actions have been undertaken in these lakes also (see Section 4).

This Annual Report updates progress against the actions approved by the Strategy Group and provides updates on cumulative nitrogen and phosphorus reduction targets for Deed Lakes. It also provides in-lake Trophic Lake Index (TLI) results for lakes. Section 8 of this report outlines the financial information required for Deed reporting.

This report provides a summary of water quality results for all lakes for the 2011/2012 financial year, while more specific information on each lake is contained within Sections 3 and 4. Section 3 provides detail of the actions undertaken in Deed-funded lakes.

Information to meet Deed funding financial reporting requirements is contained within Sections 7 and 8.

This report does not detail planned expenditure and action for the 2012/2013 year; this is contained in the Rotorua Te Arawa Lakes Programme Report 2012/2013.

3 Annual highlights for past year

The last financial year marked the start of the transition towards a new era for the lakes programme. Approval was given by Cabinet for a more outcomes-focused funding Deed, where the focus has shifted from actions to outcomes for water quality.

As of 30 June 2012, the programme has progressed as follows:

1 Lake Rotorua's annual water quality TLI result of 4.08 exceeded the TLI target (4.2) and the three-yearly average is down to 4.4.

2 Aeration/destratification devices were established in Lake Rotoehu in April 2012.

3 Lake Rotorua wastewater treatment plant: Rotorua District Council has completed the upgrade works at the city Wastewater Treatment Plant (WWTP), using Membrane Bio-Reactor (MBR) technology.

4 Two of the largest floating wetlands in the world were established in Rotoehu and Rotorua.

5 Hamurana Sewage Scheme has progressed significantly with 400 properties now connected with commissioning; this is well ahead of schedule.

6 A Land Use Change Agreement was secured which retired over 600 ha of land to trees in the Lake Rotoehu Catchment.

7 Okere Falls, Otaramarae and Whangamarino Sewerage Scheme have progressed.

4 Water quality results – All lakes

The water quality targets were set in consultation with community and they reflect points in time when the community were satisfied with the quality of water in the lakes. This information has been converted into water quality targets, expressed as "Trophic Level Index", or TLI.

Bay of Plenty Regional Council monitors lake water quality monthly for calculating TLI's. TLI's are calculated from lake concentrations of nitrogen, phosphorus (plant nutrients), chlorophyll-a (a measure of algal biomass), secchi disk (water clarity) and, if applicable, hypolimnetic (bottom water) dissolved oxygen data.

All of the Rotorua lakes have TLI targets, as defined in the Regional Water and Land Plan. Lake TLI targets and monitoring results are summarised in Table 1 below. Please note that TLI results are shown both as three-yearly averages from 2009 to 2012 plus a single TLI value for 2012 (i.e. for the year to June 2012). Also included in the table is a description of lake trophic status. The higher the TLI the poorer the water quality.

Table 1 Three-yearly average TLI and 2011/2012 annual TLI compared against the targets in the Regional Water and Land Plan.

Lake *Regional Water and Land Plan TLI units*	3-yearly average TLI to 2009 *TLI units*	3-yearly average TLI to 2010 *TLI units*	3-yearly average TLI to 2011 *TLI units*	3-yearly average TLI to 2012 *TLI units*	2011/2012 Annual TLI *TLI units*	Lake Type *based on Trophic Status*
Rotoiti **3.5**	**3.9**	**3.9**	**3.9**	**3.8**	**3.81**	**Mesotrophic**
Okareka **3.0**	**3.3**	**3.2**	**3.3**	**3.3**	**3.35**	**Mesotrophic**
Rotorua **4.2**	**4.7**	**4.7**	**4.6**	**4.4**	**4.08**	**Eutrophic**
Rotoehu **3.9**	**4.5**	**4.5**	**4.4**	**4.3**	**4.16**	**Eutrophic**
Rotomahana **3.9**	4.0	4.0	4.0	4.0	4.02	Mesotrophic
Ōkaro **5.0**	5.3	5.1	5.1	5.1	5.46	Supertrophic
Rerewhakaaitu **3.6**	3.7	3.8	3.8	3.8	3.70	Mesotrophic
Tikitapu **2.7**	3.0	3.1	3.0	2.9	2.86	Oligotrophic
Ōkataina **2.6**	2.8	2.8	2.8	2.9	2.99	Oligotrophic
Tarawera **2.6**	2.9	2.8	2.8	2.9	3.05	Oligotrophic
Rotoma **2.3**	2.5	2.4	2.3	2.3	2.48	Oligotrophic
*Rotokakahi** ***3.1***	*4.0*	*4.3*	*4.2*	*4.2*	*3.90*	Mesotrophic

Italicised figures are based on Te Wairoa Stream monitoring and a 3-parameter TLI (no secchi disk).

5 Actions and outcomes – Deed funded lakes

5.1 Lake Rotoehu

The cumulative reductions in nitrogen and phosphorus are currently exceeding targets for the Lake Rotoehu catchment (Figure 2). Securing a land use change agreement which achieves the total phosphorous target as well as half of the nitrogen target was the most significant achievement for long term improvement in Lake Rotoehu's water quality.

A mix of both long term and short term actions have contributed to achieving the targets for this lake. Although nitrogen and phosphorous reductions are currently exceeding targets, further action will be required to secure long term reductions from catchment land use.

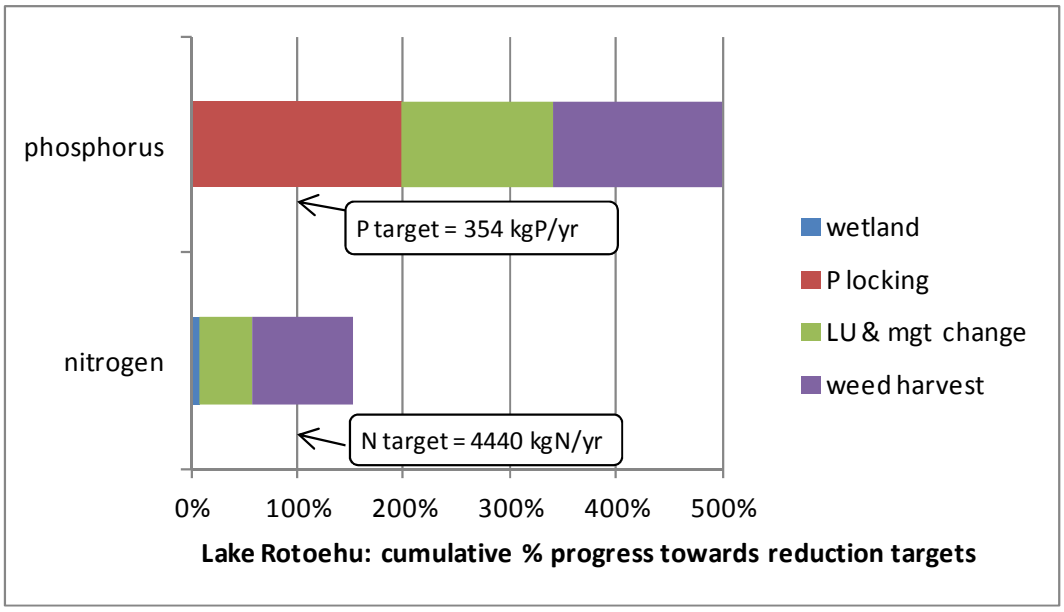

Figure 1 Cumulative progress to Rotoehu targets June 2012.

5.1.1 Results in lake water quality

The 2011/2012 TLI for Lake Rotoehu is the same as that recorded in 2010/2011, meaning that the three-yearly average has continued to move downward. This sustained improvement in water quality is due to the reduction in nitrogen in the lake from hornwort harvesting and subsequent reduction in the intensity of cyanobacteria blooms. No health warnings due to algal blooms have been issued for the lake over the past three summer seasons.

5.1.2 Phosphorus Locking Plant – Soda Springs

The Soda Springs phosphorus locking plant, commissioned in March 2011, operated to plan for the year and removed an estimated 700 kg of phosphorus from the lake. Monitoring is in place to confirm the level of phosphorus reduction.

5.1.3 Floating wetland

A 2,800 m^2 floating wetland was established in August 2011 and is expected to remove 220-340 kg nitrogen annually. Monitoring was carried out in tank tests prior to installation. There is no specific monitoring for the wetlands uptake as it is too difficult in the natural environment. However, water quality monitoring will show levels of nutrients in the lake on an annual basis.

5.1.4 Weed harvesting

A total of 1,500 tonnes of hornwort was removed in the 2011/2012 financial year, which equated to about 3.54 tonnes of nitrogen and 0.472 tonnes of phosphorus removal from within the water column. While this is a short term measure, it provides some interim progress on nutrient reductions until permanent land use measures can be delivered.

The first three years of weed harvesting has successfully contributed to about 50% nitrogen reductions in lake water.

5.1.5 Land use change

An agreement was successfully reached with the multiple owners of a large Māori land block, to convert 668 ha of pasture to pine trees over the 2011/2012 and 2012/2013 financial year. Of this, 167 ha was complete last financial year. This agreement secures 4,036 kg per year of nitrogen and 768 kg per year of phosphorous.

Further funding will still be required to secure long term nitrogen targets, which is likely to require an additional 2.6 tonnes from rural land use. Funding for this is provided in the 2013/2014 financial year.

5.1.6 Aeration trails

Aeration was approved as an action by the Strategy Group and by the Crown through the annual programme. The project meet its target commissioning date of April 2012 and is currently being trialled in Rotoehu to determine design parameters for eventual use in Rotorua. Aeration addresses lake sediment releases of nitrogen and phosphorus by a technique of de-stratification. The two machines which have now been installed are supported by a comprehensive monitoring programme which will assess effectiveness. The information from this trial will be used to update code in the hydrodynamic models for Lake Rotoehu and Rotorua and will assist in providing advice on the application of this technology on Lake Rotorua.

5.2 Lake Rotorua

Progress towards achieving the reduction targets for Lake Rotorua has been slow for nitrogen, but more positive for phosphorus (Figure 2). Good gains in phosphorous reduction have been made through the Utuhina and Puarenga P-locking plants. Further reductions will accrue from the farm-based phosphorus reduction works and sewage reticulation. Note that the total targets reported on in the table are the reductions funded through Deed expenditure. Further nutrient reductions (70 tonnes approximately) are required to meet the sustainable load of 435 tonnes of Nitrogen (refer Annual Programme 2012/2013 for further information).

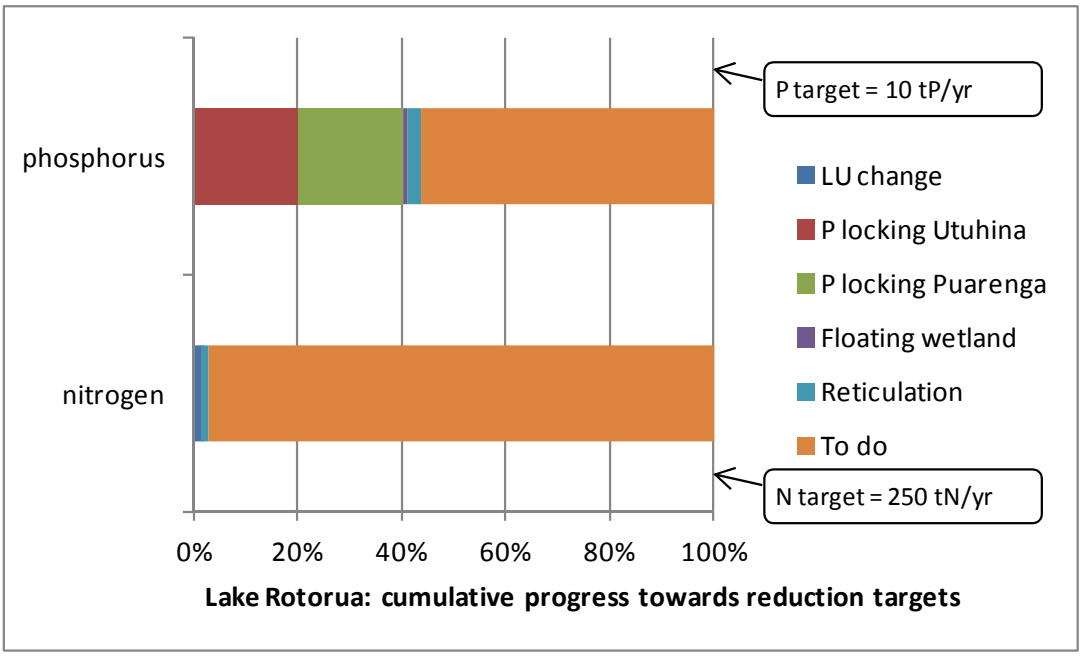

Figure 2 Cumulative progress to Rotorua targets June 2012.

5.2.1 Results in lake water quality

In 2011/2012 the TLI in Lake Rotorua moved below its target for the first time since the regional monitoring programme began in 1991. Reduced lake phosphorus concentrations have resulted in a decrease in productivity and increased water clarity. The reduction of phosphorus loading to the lake is a result of the treatment of the Utuhina and Puarenga Streams with aluminium sulphate (alum). Alum not taken up by phosphorus contained in the streams also binds up lake phosphorus. This reduces the available phosphorus pool for algal growth in the lake, leading to an improvement in trophic status. In addition to this, the in-lake monitoring buoy showed that water temperature was cooler (by approximately two degrees Celsius) and stratification events in the lake were shorter than normal over the 2011/2012 summer period. These factors are likely to have reduced the amount of nutrient released from the bottom sediments.

5.2.2 Tikitere de-nitrification plant

The pilot plant was commissioned in January 2011. Some trialling has begun, however a major plant revamp was required to resolve sediment and pH issues in the incoming stream water. Testing will continue before the full scale plant is embarked on. Once commissioned, it is expected that this intervention has potential to remove up to 30 tonnes of nitrogen annually from entering Lake Rotorua. Regional Council staff are also investigating the use of locally-mined zeolite for nitrogen removal. This alternative was investigated five years ago; however, although the performance was good, there was no end use for the spent zeolite at that time. Subsequent changes within the fertiliser industry mean that there may now be a use for the spent zeolite; this option also being investigated.

5.2.3 P-locking plants

The Utuhina and Puarenga Stream plants continue to operate, although the Utuhina plant was decommissioned for a short time to repair bund damage. A report has been completed on the alum dosing which shows total phosphorus removal appears to be about five times greater than predicted, probably due to alum impacts in the lake itself.

Ongoing monitoring and lake modelling will clarify the nature and causes of these impacts so that the alum dosing programme can be adjusted if necessary. One possible implication is that the Awahou plant may no longer be needed.

5.2.4 Land use and land management change

Overall progress on land use and land management change in the Lake Rotorua catchment has remained slow. To date, approximately four tonnes of nitrogen has been achieved through land use change. This nitrogen reduction has ranged in price from $110/kg N/ha/year to $280/kg N/ha/year.

Gorse and dry-stock have been converted to pine trees with bridging finance being provided for by the Regional Council. This has been refunded by the Afforestation Grants Scheme, and in 2011/2012 a total of 110 ha was converted as part of this scheme in the Rotorua catchment. The only costs were administrative costs associated with funding.

Excluding the bridging finance at these prices, the large Deed reduction target (170 tonnes N/yr) cannot be achieved with the available $9.5 million. Therefore Bay of Plenty Regional Council and RTALSG have proposed to shift funding from other interventions into land use and land management change.

The Hamurana wall proposal ($16 million) is now considered ineffective, with water quality modelling by University of Waikato showing only marginal benefits. Iwi affected by the proposal are also opposed to this option. The Lake Rotoiti sediment capping proposal ($7 million) is now considered unnecessary given the success of the Ohau diversion wall. However on-going lake monitoring will clarify if future sediment treatment is needed.

Finally, recent investigations around sediment capping in Lake Rotorua indicate that there are treatment options that are significantly more cost effective than initially proposed. It is recommended that the Lake Rotorua sediment management budget be reduced from $25 million to $10 million and focus shifted to alternative methods. This will set aside sufficient funding for sediment treatment, either by sediment capping with alum or aeration to prevent nutrient releases.

Analysis indicates that to secure a long term improvement in Lake Rotorua's water quality there must be a significant reduction in nutrient loss from land use in the catchment.

Reducing inputs to the lake are also the most environmentally sustainable interventions available and addresses the cause of the problem directly at its source.

The Regional Council has sought a transfer of the $38 million funding from in-lake interventions, into on-land interventions in the Lake Rotorua catchment. Also, $7.5 million is yet to be received from the Crown for on-land interventions. Together with the $38 million to be transferred, a total of $45.5 million will be available to achieve a 200 tonne reduction in nitrogen through land use change and land management change actions.

Several steps have been taken in the past year to support the increased focus on reducing nutrient losses from land, including:

- Hearings and decisions on the proposed Regional Policy Statement, with explicit policies on the development of rules and nutrient allocation to achieve the sustainable annual nitrogen load of 435 tonnes by 2022. These key provisions are subject to Environment Court appeals.
- Working with the Lake Rotorua Primary Producers Collective, including (non-Deed) funding of a part-time coordinator and initiating a "Farmer Solutions Project" (also non-Deed funded) to model nutrient and financial impacts across dairy and drystock farms in the catchment.
- Establishing a Stakeholder Advisory Group to help develop an integrated "rules and incentives" package, subject endorsement by Strategy Group.
- Restructuring the Rotorua office to increase delivery capacity.

Further progress will be made towards determining funding criteria, delivery mechanisms and process in collaboration with the Stakeholder Advisory Group in 2012/2013.

5.2.5 **Phosphorus project**

Bay of Plenty Regional Council staff have worked with farmers over the past year to establish Detainment Bunds for mitigating nutrient laden storm water run-off. A NIWA report (Rutherford and Timpany, 2008) identified that storms shifted large amounts of phosphorus (12 tonnes P/annum) from the landscape to the lake. The P-Project is

designed to intercept some of this phosphorus and establish a basis for collaboration with farmers on addressing all practical nutrient-loss interception opportunities on their farms. The farmer response has been enthusiastic with active sharing of the construction work. Five structures have been built on private land and two of these are being intensively monitored for P-detaining effectiveness by a University of Wellington post-graduate student.

Some of the structures are in the Hauraki Stream Catchment where previous floods had damaged State Highway 36. The NZ Transport Agency (NZTA) was invited to participate in the project as there is proven co-benefit with reduction of peak storm flows for reducing damage to roading infrastructure. NZTA responded with full funding of the particular structures intercepting flood water flows above State Highway 36. This input of $51,000 from NZTA means that the first phase of the five-year P-Project is approximately 50% cheaper to date than anticipated. Full results of the monitoring on nutrient reduction efficacy of the structures are expected in February 2013. If this data coupled with all co-benefit assessment is positive, it is planned to continue to support this type of collaborative farmer engagement on nutrient-loss mitigation works for a further four years.

5.2.6 Sewage reticulation

The Hamurana/Awahou scheme is 80% complete. The construction of the sewerage scheme was started in September 2011 and is due to be completed in October 2012. The construction date is five months ahead of schedule (March 2013) and a year in advance of the funding deed programme. Rotorua District Council has advanced the construction of this scheme due to the delay in establishing a WWTP site for Gisborne Point/Hinehopu Sewerage Scheme. There are approximately 400 properties connected into the sewerage system with approximately 100 yet to connect. The capital contribution towards capacity in the Rotorua Wastewater treatment plant of $2.624 million has been recognised in these financial statements.

The Rotokawa Brunswick Sewerage Scheme was effectively completed in November 2009. About 80% of the scheme's 351 households were connected by June 2011. The majority of the remaining 20% of households are proposed to be connected during the 2013/2014 financial year, completing the scheme. The outstanding work previously reported has now been substantially completed and the balance will be reflected in the next financial report.

5.2.7 Rule 11 nutrient benchmarking

Benchmarking is an important project within the programme as it caps any further increases in nutrient to our five most degraded lakes to a limit set by 2001/2004 average farm discharges.

Benchmarking progress in the Lake Rotorua catchment, as of July 2012, comprised of benchmarks for 72 properties (greater than 40 ha), totalling 19395 ha and 28 properties (less than 40 ha), totalling 523 ha. A further 22 properties are being benchmarked through the Lake Rotorua Primary Producers Collective. It is expected that these will be completed by October 2012. Lake Ōkaro, Rotoehu and Ōkāreka have also been benchmarked.

5.3 Lake Rotoiti

Bay of Plenty Regional Council did not undertake any Deed funded works for Lake Rotoiti in 2011/2012 financial year. The nitrogen reduction target for Lake Rotoiti has now been reached, with the phosphorus reduction target status yet to be confirmed (Figure 3). However, further sewage reticulation is yet to be completed and will contribute to this target. The majority of gains have been achieved through construction of the Ohau Diversion Wall (not part of the Funding Deed) as well as sewage reticulation.

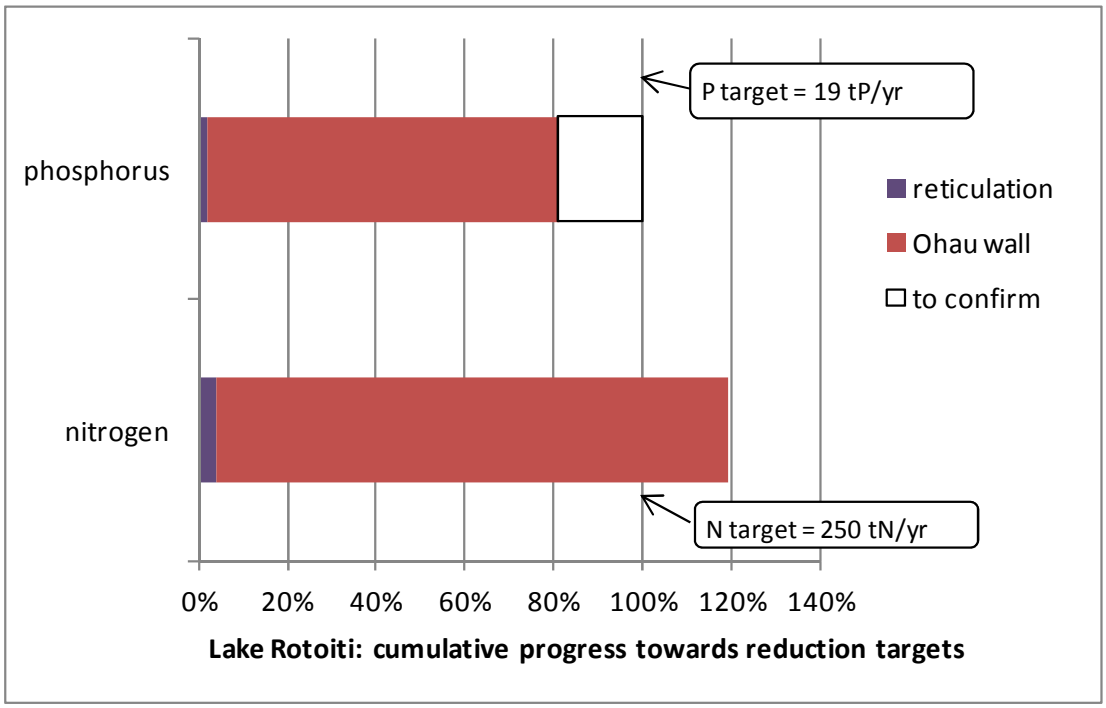

Figure 3 Cumulative progress to Rotoiti targets June 2012.

5.3.1 Results in lake water quality

The annual TLI in Lake Rotoiti is stable but showed a slight improvement in 2011/2012. The factors driving the decrease in the TLI include a small reduction in nitrogen concentrations and a decrease in hypolimnetic phosphorus concentrations.

5.3.2 Sewage reticulation

The Gisborne Point/Rotoiti/Hinehopu Sewerage Scheme is only 10% complete and has been further delayed due to Environment Court appeals on the discharge permit. The Environment Court hearing commenced in early July and has subsequently adjourned to allow the Rotorua District Council to investigate alternative disposal sites within the general area. In the past year, Rotorua District Council has gone through a resource consent process, finalised the reticulation design, undertaken further community consultation, mediation on appeals and prepared for an Environment Court Hearing.

Construction on the Ōkere Falls/Ōtaramarae/Whangamarino Sewerage Scheme started in October 2010, approximately six months behind the schedule set in the three-year programme. Construction of the reticulation network was substantially completed in late August 2011.

5.4 Lake Ōkāreka

Only minor works associated with existing land use change agreements were undertaken during the 2011/2012 financial year. The nitrogen and phosphorus reduction targets set in the Lake Ōkāreka Catchment Management Action Plan were met according to models, but further monitoring is required to confirm.

Success in reaching targets for this lake have been primarily due to sewage reticulation, and the conversion of 122 ha of pastoral land to forestry and native bush (Figure 4).

The Rotorua Te Arawa Lakes Strategy Group have put further spending of Deed funding on hold until results for phosphorous reductions are finalised. If all targets are already met, continued action in the lake is not considered to be the best use of the budget.

Staff will continue monitoring for six months; once results are finalised, a decision will be made on whether or not additional land use change is required.

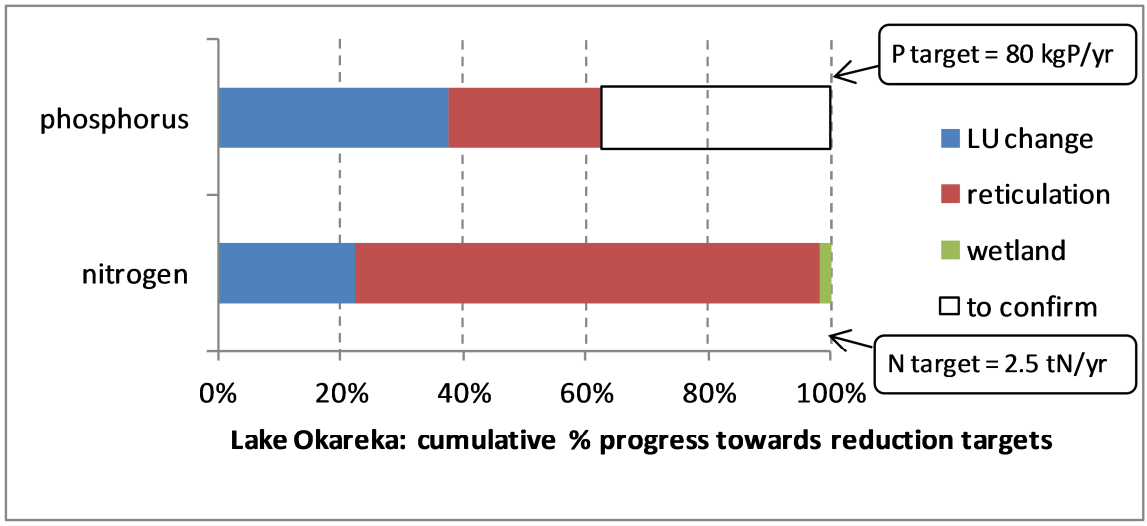

Figure 4 Cumulative progress to Ōkāreka targets June 2012.

5.4.1 Results in lake water quality

The TLI in Lake Ōkāreka showed a slight increase in 2011/2012 mainly as a result of an increase in phosphorus concentrations. Soluble phosphorus levels in the hypolimnion also increased marginally over the stratification period. Nitrogen concentrations continue to show some improvement, but water clarity showed some decline as chlorophyll-a concentrations had increased from the previous year.

6 Actions and outcomes for all other lakes

6.1 Lake Tarawera

An Action Plan is currently under development and over the past year, five public meetings have been held with the public and stakeholders. These included; a drop-in day held at the lake, a workshop, and meetings with specific stakeholders to discuss their concerns. Staff are currently awaiting further consultation with iwi before progressing the Action Plan.

6.1.1 Results in lake water quality

The TLI in Lake Tarawera increased again in 2011/2012 due to an increase in soluble and particulate phosphorus. Nitrogen concentrations also showed an increase compared to the previous two years which is likely to be driving the half-metre decrease in water clarity. At a TLI of 3.0, the lake is now on the boundary of being termed mesotrophic rather than oligotrophic.

6.2 Lake Rerewhakaaitu

Regional Council staff completed a scope for the possible development of a Lake Rerewhakaaitu Action Plan. The findings of the scope were presented to the Strategy Group meeting on 28 September 2012, in a report titled *"Update on nutrient management activities in the Lake Rerewhakaaitu Catchment".*

The catchment land owners are also in their third year of Sustainable Farming Fund project. Implementation of the project has resulted in 25 farms implementing nutrient management plans on farms and this is resulting in reductions of nutrients to the lake.

6.2.1 Results in lake water quality

The TLI in Lake Rerewhakaaitu is stable, maintaining a similar annual TLI to the previous year. The Lake SPI monitoring shows a recent decline in native charophytes, which is attributed to a decline in water clarity.

6.3 Lake Ōkataina

A draft Lake Ōkataina Action Plan has being developed. An update of the progress (included workshops and meetings with specific stakeholders and iwi) was presented in the last Strategy Group meeting in June 2012.

A report is scheduled to be presented to Strategy Group at the meeting on 28 September 2012, recommending the release of the package (draft Action Plan, feedback from, information sheet and background information document) for public feedback.

6.3.1 Results in lake water quality

In 2011/2012 Lake Ōkataina recorded its highest annual TLI in a decade. This is due to increased phosphorus levels; the highest measured since regional monitoring began in the lake in 1992. Increased phosphorus levels are likely to be the main cause of the increase in chlorophyll-a concentrations leading to a decrease in water clarity. More intensive rainfall events have resulted in one of the highest lake levels recorded in the past two decades and the increased runoff from these events probably explains the higher phosphorus levels. The hornwort infestation discovered in the lake several years ago continues to be managed.

6.4 Lake Rotokakahi

Engagement meetings have been held with various stakeholders including: Lake Rotokakahi Trustees, Lake Rotokakahi owners hapu, Timberlands Forestry, Te Arawa, Department of Conservation, and Fish and Game. Regular update newsletters are sent to the Hapū. A Science combined lakes meeting for Lakes Ōkataina, Tarawera and Rotokakahi was held to discuss knowledge and gaps in science. A finalised and peer-reviewed Nutrient Budget was published and a draft Action Options Analysis is underway.

A decision was made to complete the Action Plan by June 2013 due to slow response with Lake Rotokakahi-involved iwi engagement.

6.4.1 Results in lake water quality

The TLI in Lake Rotokakahi in 2011/2012 (based on the results of monitoring of the Te Wairoa Stream) remains reduced, compared to the high value seen in the 2009/2010 financial year. Cyanobacteria levels have remained well below those seen two years previously, with phosphorus concentrations remaining stable but elevated compared to those of a decade ago.

6.5 Lake Ōkaro

6.5.1 Results in lake water quality

During 2011/2012, Lake Ōkaro displayed the highest average chlorophyll-a concentration since 2005, reflecting an increase in total phosphorus concentrations. A large influx of phosphorus occurred due to an intense rainfall event in May, after which a sustained algal bloom occurred, made up of predominantly *Anabaena* (*Dolichospermum*) *spiroides*. A similar bloom also occurred in December 2011, resulting in the issuing of a health warning. The increased productivity in the lake has seen the TLI increase. This is despite the application of products to reduce the release of phosphorus from the bottom sediments.

Works associated with the Lakes Protection Agreement on Rotomahana Station have been completed; auditing of the agreement shows that all conditions have now been met. To complete all conditions over the past 12 months, a further 26 ha of pasture was converted to pine planation and stock yards located on lease land close to the lake have been decommissioned; both reducing discharges of nutrient to the Lake.

6.6 Lake Rotomā

6.6.1 Results in lake water quality

The TLI in Lake Rotomā in 2011/2012 increased above its objective TLI; however, the three-yearly average TLI remains at the Bay of Plenty's Regional Water and Land Plan objective of 2.3. As with some of the other lakes, the average phosphorus concentration for the 2011/2012 financial year, is the highest recorded since regional monitoring began in 1991. Conversely, nitrogen concentrations in Lake Rotomā are at the lowest recorded in two decades, which is likely to be a result of very high lake levels.

7 Supporting activities general

7.1 Sustainable Land Use Implementation

The Regional Council's Sustainable Land Use Implementation programme has promoted sustainable land practices in Rotorua Te Arawa Lakes catchment. Over the past 12 months this has contributed toward nutrient reductions in lakes by assisting land owners to fence and retire lake margins from stock.

Specific progress made over the last financial includes:

- Lake Rotorua - 3.5 km of additional fencing with 90% of the lake margin now fenced.
- Lake Ōkataina - 0.48 km of additional fencing with 97% of the lake margin now fenced.
- Lake Tarawera - 0.56 km of additional fencing with 97% of the lake margin now fenced.
- Lake Rotomahana - 1.0 km of additional fencing with 88% of the lake margin now fenced.

Lakes Rerewhakaaitu, Rotoiti and Rotomā are all 100% completed. The nutrient reductions associated with these actions has not been quantified.

7.2 Science and Research activity

Over the past year, the key highlights for the science and research activity have included:

- The Water Quality Technical Advisory Group (TAG) has continued to provide high quality expert advice to the programme on a number of interventions. This has included advice on sediment and in-stream P-locking (Rotorua, Rotoehu and Okaro), lake aeration (Rotoehu), lake monitoring, land use impacts, groundwater hydrology and quality, and lake ecology.
- Phase III of the Greater Tarawera Lakes Groundwater Investigation is largely complete, meaning that monitoring bores are now installed near Lakes Tarawera, Okareka, Rerewhakaaitu, Rotomahana, Rotokakahi and Tikitapu. These bores have been tested to determine aquifer hydraulic properties, water quality and water age. The development of a conceptual model has been initiated using this information as a basis; this model will help to investigate the effects of various land use scenarios on lake water quality.
- In-lake monitoring buoys have now been installed in Lakes Rotorua, Rotoiti, Rotoehu and Tarawera, and the next one is ready to be installed in Rerewhakaaitu in the near future. The buoys are operated by the University of Waikato and provide continuous monitoring of a variety of lake conditions. This information is available on-line and supplement Bay of Plenty Regional Council's monthly water quality monitoring programme. The information is proving invaluable, particularly for lakes like Rotorua and Rotoehu whose bottom waters stratify intermittently.
- On-going hydro-dynamic and ecological lake modelling for a range of lakes within the programme. This has been focussed particularly on testing possible new interventions and linking together a cluster of models, including; land use, climate, ground water and in-lake models to test scenarios and provide advice on possible alternatives.

7.3 Bay of Plenty Regional Council policy activity

7.3.1 Regional Policy Statement (RPS)

The Proposed RPS sets out a clear policy direction for the management of all of the Rotorua Te Arawa lakes. Essentially, discharge limits will be set for catchments at risk (defined to include all Rotorua Te Arawa lakes) Managed reduction will be required for these catchments (by a specified date in the case of Lake Rotorua), and allowable discharges will be allocated amongst land use activities.

Council has notified its decisions on all submissions to the Water Quality and Land Use provisions of the Proposed RPS. Appeals have been lodged with the Environment Court against Council's decisions.

7.3.2 Ten Year Plan

Key projects and budgets have been agreed in the Ten Year Plan 2012-2022 in order to achieve Lake Rotorua's nitrogen limit. In particular, an "incentives scheme" has been identified as a way to facilitate 200 tonnes / year nitrogen reduction from rural land.

Staff are developing a business case on how the incentives scheme will be designed and delivered.

7.3.3 The Regional Water and Land Plan

Currently the RWLP addresses the issue of loss of nitrogen and phosphorus from land use activities in the "five lakes catchments" of Lakes Rotorua, Rotoiti, Rotoehu, Okaro and Ōkāreka. Increases in the existing nitrogen and phosphorus loss from land use activities to their 2001-2004 levels are prevented through Rule 11.

Rule 11 caps nitrogen loss in the five lake catchments but does not allow for reductions to be achieved. Further, there are no regulations for the remaining seven catchments. In order to give effect to the policy direction of the proposed RPS, current RWLP rules will need to be amended or new rules developed.

Lake Rotorua is a high priority, and staff are progressing rules for this lake as a matter of urgency. This is in conjunction with the incentives scheme (outlined in section 5.2.4).

7.4 District council policy activity

Rotorua District Council has just recently reviewed the District Plan. Consultation on the initial draft started in April 2011, with the second round of consultation in March 2012. It is proposed to notify the new proposed District Plan in September/October 2012.

The new proposed District Plan includes provisions to allow for changes in land use from intensive rural land use such as dairying to lifestyle blocks and other low nutrient based land use. It is hoped that these measures will encourage a more diverse land use in the Rotorua lakes catchment with an aim of reducing nutrient losses to groundwater and the land. The land use changes are proposed to work in conjunction with the nutrient reduction from land use changes proposed by the Bay of Plenty Regional Council.

8 Financial progress against the annual work programme 2010/2011

Assessing progress against the Annual Work Programme fulfils clause 5.1 and 5.3 of the current approved Deed. This information is presented in sections 8.2 - 8.5 of this report. The four tables include spending related to each project for both the Bay of Plenty Regional Council and Rotorua District Council, outlined as follows:

- Intervention and description.
- Funding contributions allocated to each party.
- Crown funding received to date.
- Intervention progress and financial position.
- Project spending for each project for the 2011/2012 year.

This annual report again uses a traffic light system to indicate project progress. Green indicates project on track and budget. Orange indicates project on track, but budget spending behind schedule, with some funding to be carried over to next year. Red indicates project and spending behind budget, with funds to be carried over to next financial year.

Additional information has been included titled “funds committed”. This is for funds which are yet to be spent but are committed to be spent by contracts. Interventions coded orange or red are discussed further in the tables on the following pages.

8.1 Financial summary at 30 June 2012 for 2011/2012 financial year

A summary of the financial position as at 30 June 2012 for each of the priority lakes is provided below (Table 2).

Table 2 Summary of financial position 2011/2012 year.

Lake		Budget 2011/2012 (M)	Committed (M)	Spent 2011/2012 (M)	Progress	Total Carry Forward (M)	Carry forward 2011/2012 (M)
Rotoehu		$0.250	$0	$1.067		($0.232)	($0.857)
Ōkāreka	BOPRC projects	$0	$0	$0.056		$0.559	($0.056)
	RDC projects	$0	$0	$1.284		$1.813	($1.284)
Rotoiti	RDC projects	$9.600	$0	$3.290		$10.369	$6.310
Rotorua	BOPRC projects	$2.050	$0	$1.664		$5.071	$0.386
	RDC projects	$4.500	$0	$12.255		($0.960)	($7.755)
Totals		**$16.400**	$0	**$19.616**		**$16.620***	**($3.256)**

The Annual Report shows progress with respect to the Crown funding deed, specifically:

Spending to Date: 2011/2012 and all Prior Years accumulated

A total of $48.39 million has been spent on the Deed projects out of a budget of $65.05 million, requiring $16.6 million* to be carried over to the 2012/2013 financial year.

Spending to date: 2011/2012 only

A total of $19.616 million been spent on the Deed projects out of $16.400 million budgeted for, requiring $3.310 million to be withdrawn from accumulated reserves in the 2011/2012 financial year.

*Prior period adjustments made to sewerage carry forward totals.

Financial Report Funding and progress for each priority lake

8.2 Lake Rotoehu Progress 2011/2012

Intervention	Total Deed budget for intervention	Deed budget for 2011/2012 (4.7.4 (a))	Work on the intervention to be undertaken in 2011/2012 (4.7.1)	Annual BOPRC contribution	Annual RDC contribution	Crown funding received	Carry forward 2012	Accumulated carry forward including past years.	Work Progress to 30 June 2012		Actual spend 2011/2012	Actual spend to date
Weed Harvesting	$900,000	$100,000		$50,000	N/A	$50,000	0	0	●	On track	$60,044	$360,044
Land use change	$500,000	0		$0	N/A	$0	($399,589)	$61,596	●	On track according to planting plant, rest of budget carry forward due to be spent next financial year according to contract	$399,589	$438,404
Phosphorus Locking Soda Springs	$1,600,000	$150,000		$75,000	N/A	$75,000	($79,032)	$85,118	●	On track	$229,033	$764,882
Wetland	$600,000			0	N/A	0	0	0	●	Complete	0	$600,000
Aeration	0	0					($378,668)	($378,668)	●	On track installed	$378,668	$378,668
Totals	$3,600,000	$250,000		$125,000	N/A	$125,000	($857,289)	($231,954)			$1,067,334	$2,541,998
BOPRC projects	$3,600,000	$250,000		$125,000	N/A	$125,000	($857,289)	($231,954)			$1,067,334	$2,541,998

Key: ● **On track** ● **On track, budget spending behind schedule, likely to be spent by year end** ● **Project and spending behind budget, and will be under-spent by year end**

Bay of Plenty Regional Council – Variance explained

Under-spending in the Land use change budget is as forecast and in accordance with the six-month report. The delay in spending is due to planting season limitation; the remaining funds are scheduled to be spent in 2012/2013 financial year.

The Phosphorus locking plant has underspent funding, which is being carried forward, due to delays in commissioning. Further to this, if less product (alum) is required to operate the plant, then this may increase the amount underspent. A case may be bought to Strategy Group to transfer this to other longer term solutions. This is subject to further testing, however, and is reported in the Annual Report for the Lakes Programme 2012/2013.

Aeration expenditure was approved by the Strategy Group and endorsed by Crown approval of the Annual plan in 2011/2012. No Deed budget for intervention is shown as this is a new project. Also, no budget or contributions from either party as expenditure is covered by overdrawing reserve; redistribution of Deed funds will cover this expenditure.

8.3 Lake Ōkāreka Progress 2011/2012

Intervention	Total Deed budget for intervention	Deed budget for 2011/2012 (4.7.4 (a))	Work on the intervention to be undertaken in 2011/2012 (4.7.1)	Annual BOPRC contribution	Annual RDC contribution	Crown funding received	Carry forward 2012	Accumulated carry forward including past years	Work Progress to 30 June 2012		Actual spend 2011/2012	Actual spend to date
Land Management Change	$1,000,000	$0		$0	N/A	$0	($55,718)	$559,304	●	Complete – further work on hold pending monitoring results	$55,718	$440,696
Sewage Reticulation	$9,700,000	$0		N/A	$0	$0	($1,284,000)	$1,813,000	●	Complete	$1,284,000	$7,887,000
Totals	$10,700,000	$0		$0	$0	$0	($1,339,718)	$2,372,304			$1,339,718	$8,327,696
BOPRC Projects	$1,000,000	$0		$0	$0	$0	($55,718)	$559,304			$55,718	$440,696
RDC Projects	$9,700,000	$0		$0	$.0	$0	($1,284,000)	$1,813,000			$1,284,000	$7,887,000

Key: ● **On track** ● **On track, budget spending behind schedule, likely to be spent by year end** ● **Project and spending behind budget, and will be under-spent by year end**

Rotorua District Council – Variance explained

The Okareka scheme was commissioned in November 2010 and all 296 properties within the sewerage scheme area were connected in March 2011. The sewerage scheme was completed six months ahead of schedule. The total deed scheduled expenditure was expected to be zero for the 2011/2012 financial year. However, $1.284 million was actually spent, giving a variance to date of $1.813 million for 2012.

$0.621 million of the variance relates to the transfer of pump unit costs previously assigned to the Okere Falls/Otaramarae/Whangamarino Sewerage Scheme to the Okareka Sewerage Scheme. An audit of accounts showed that this expenditure was incorrectly assigned.

The capital contribution of $533,000 towards the capacity in the Rotorua Wastewater Treatment Plant is recognised in the financials.

To date, the Ōkāreka Sewerage Scheme has incurred expenditure of $7.887 million compared to the deed schedule of $9.7 million. This is an under-spend (as at 30 June 2012) of $1.813 million to be applied as follows. The balance of $1.813 million is the savings predicted at the end of the project and it is requested that this be transferred to Hinehopu/Gisborne Point.

Bay of Plenty Regional Council – Variance explained

Minor forestry works associated with existing land use agreement were undertaken last year, which were not forecast. This was a technical omission from the budget and was necessary due to planning seasons. This was reported as part of an existing agreement and is within the total budget of $1,000,000.

8.4 Lake Rotoiti Progress 2011/2012

Intervention	Total cost of intervention	Total Cost Estimated 2011/2012 (4.7.4 (a))	Work on the intervention to be undertaken in 2011/2012 (4.7.1)	Annual BOPRC contributions	Annual RDC contributions	Crown funding received	Carry forward 2012	Accumulated carry forward including previous years	Work Progress to 30 June 2012		Actual spend 2012	Total spend to date
Sewage Reticulation	$26,600,000	$9,600,000	Sewerage reticulation for Okere/Otaramarae/ Whangamarino	$0.00	$2,300,000	$2,300,000	$1,665,000	$4,450,000	●		$2,935,000	$10,249,000
			Sewerage reticulation for Gisborne Point/Hinehopu	$0.00	$2,500,000	$2,500,000	$4,645,000	$5,918,000	●		$355,000	$1,532,000
Totals	$26,600,000	$9,600,000		$0.00	$4,800,000	$4,800,000	$6,310,000	$10,368,000			$3,290,000	$11,781,000
BOPRC Projects	N/A	NA		N/A	N/A	N/A	NA	NA			N/A	N/A
RDC Projects	$26,600,000	$9,600,000		$0.00	$4,800,000	$4,800,000	$6,310,000	$10,368,000			$3,290,000	$11,781,000

Key: ● **On track** ● **On track, budget spending behind schedule, likely to be spent by year end** ● **Project and spending behind budget, and will be under-spent by year end**

Rotorua District Council - Variance explained

Okere Falls/Otaramarae/Whangamarino Sewerage Scheme under-spend $4.451 million.

Detailed design was completed and a contract tendered for the Ōkere/Otaramarae/Whangamarino Sewerage Scheme in the 2009/2010 financial year.

Construction on the Ōkere Falls/Ōtaramarae/Whangamarino Sewerage Scheme started in October 2010, approximately six months behind the schedule set in the three-year programme. Construction of the reticulation network was substantially completed in late August 2011.

To date, $10.249 million has been spent on the Ōkere/Otaramarae/Whangamarino Scheme, compared to the scheduled $14.7 million.

The $4.451 million under-spend is to be applied as follows:

- $0.554 million carried forward to 2012/2013 scheme construction costs post 30 June 2012. The carry-forward is to complete outstanding works.
- The balance of $3.897 million is the savings predicted at the end of the project. It is requested that this be transferred to Gisborne Point/Hinehopu Sewerage Scheme.

Gisborne Point/Rotoiti/Hinehopu Sewerage Scheme under-spend $5.918 million

To date, a total of $1.532 million has been spent, compared to the scheduled $7.450 million. The total under-spend of $5.918 million is a result of delays in securing the resource consent for the WWTP and working through reticulation network issues with the local community.

The $5.918 million under-spend will be applied as follows;

- $4.291 million carried forward to 2012/2013 scheme construction costs post 30 June 2012.
- $1.627 million carried forward to 2014 scheme construction costs post 30 June 2013.

8.5 Lake Rotorua Funding 2011/2012

Intervention	Total cost of intervention	Total Cost Estimated 2011/2012 (4.7.4 (a))	Work on the intervention to be undertaken in 2011/2012 (4.7.1)	Annual BOPRC contribution	Annual RDC contribution	Crown funding received	Carry forward 2011/2012	Accumulated carry forward including previous years	Work Progress to 30 June 2011		Actual spend 2011/2012	Total spend to date
Phosphorus locking in the Utuhina Steam	$3,600,000	$400,000	Continue dosing	$200,000	N/A	$200,000	$157,711	$464,578	●	Operational	$242,289	$1,135,422
Phosphorus locking in the Puarenga Steam	$4,050,000	$450,000	Continue dosing	$225,000	N/A	$225,000	($103,301)	$42,743	●	Operational	$553,300	$1,757,256
Phosphorus Locking in the Awahou Stream	$3,800,000	$450,000	None planned	$225,000	N/A	$225,000	$446,783	$1,540,878	●	Not proceeding with this project	$3,217	$9,121
Tikitere Geothermal Treatment	$4,800,000	$250,000	Continue to work on pilot plant modelling	$125,000	N/A	$125,000	$175,840	$2,626,923	●	Delay in design while testing pilot plant continues	$74,160	$923,077
Land Management Change	$9,500,000	$500,000	Planned to achieve 5 tonnes of Nitrogen	$250,000	N/A	$250,000	$160,820	$847,354	●	Working on collaborative solution	$339,180 - $44,000 Revenue for P-detention structures from NZTA	$1,152,646
Wetland Construction	$1000,000	$0	Contributed to floating wetland in Lake Rotorua				($451,774)	($451,774)	●	Contributed $450,000 to floating wetland	$451,774	$451,774
Sewage Reticulation	$28,500,000	$4,500,000		N/A	$2,250,000,	$2,250,000	($7,755,000)	(960,000)	●		$12,255,000	$20,310,000
Totals	$54,250,000	$6,550,000		$1,025,000	$2,250,000	$3,275,000	($7,368,921)	$4,110,702			$13,918,921	$25,739,296
BOPRC Projects	$25,750,000	$2,050,000		$1,025,000	N/A	$1,025,000	$386,079	$5,070,702			$1,663,921	$5,429,296
RDC Projects	$28,500,000	$4,500,000		N/A	$2,250,000	$2,250,000	($7,755,000)	($960,000)			$12,255,000	$20,310,000

Key: ● **On track** ● **On track, budget spending behind schedule, likely to be spent by year end** ● **Project and spending behind budget, and will be under-spent by year end**

Bay of Plenty Regional Council - variance explained

Wetland: Approval was also given to use a portion of Bay of Plenty Regional Council's wetland project budget to support the inlake floating wetland in Lake Rotorua. The funds required to cover this expenditure have overdrawn the reserve and funds will be coming in 2012/2013 to cover this.

Land Use and Management Change: The Rotorua Lakes Land Use Change and Land Management change expenditure is split between two projects, the Particulate Phosphorus project ($150,766) and the Land Management change project ($188,412).

Of the money spent on the Particulate Phosphorus project, $45,000 was reimbursed by the NZ Transport Agency, therefore reducing the net expenditure to $105,000 for phosphorus detention structures.

The funding spent on Land Use Change agreement was bridging finance to Afforestation Grant Scheme applications. The funds will be received back into the project budget this financial year, making the total expenditure for Land Use Change close to zero. Providing bridging finance lead to a total of 110 ha of gorse and drystock converted to pine plantation.

The project has a total under-spend of $847,000 which will increase by $188,000 when grants are refunded to the Programme. This under-spend has been due to a hold on expenditure while funding policy and an integrated framework for achieving the overall targets is designed. The funding for this project is still a high priority but proper planning and meaningful engagement with stakeholders is required to ensure efficient and effective use of funds.

Awahou Phosphorus locking plant: The reserve funds held for cancelled P Locking Awahou project are to be redistributed to cover expenditure on Land Management change in Lake Rotoehu in 2013/2014 as detailed in the Bay of Plenty Regional Council Ten Year Plan 2012-2022 and as approved by the Strategy Group in December 2011.

Rotorua District Council – Variance explained

The Lake Rotorua Catchment shows a $0.960 million over-spend, over the whole project year to date 30 June 2012; this is explained as follows:

Hinemoa Point over-spend $349,000

The Hinemoa Point Sewerage Scheme reticulation network was essentially completed in August 2008; however, as at August 2012, there were still four properties outstanding for connection.

As advised in the previous annual report, the scheme's original estimate was $1 million. The final completed works cost $1.349 million.

This $349,000 over-spend at the end of the project is the result of $223,000 under estimation of construction costs and a contribution towards the WWTP capacity $126,000. The capital contribution towards the capacity of the Rotorua Treatment Plant from the Hinemoa Point Sewerage Scheme is recognised within the financials.

To cover the $349,000 over-spend it is requested that the savings anticipated at the end of the Rotokawa/Brunswick project be transferred to Hinemoa Point.

Rotokawa and Brunswick under-spend $5.267 million

The Rotokawa Brunswick Sewerage Scheme was effectively completed in November 2009. About 80% of the scheme's 351 households were connected by June 2011. The majority of the remaining 20% of households are proposed to be connected during the 2013/2014 financial year, making the scheme 100% complete.

A total of $7.233 million has been spent to-date on the sewerage scheme, out of a projected deed expenditure of $12.5 million. This has resulted in an under-spend (as at 30 June 2012), at the end of the project, of $5.267 million. The reported under-spend does not include the expenditure prior to the funding deed of $1.4 million and the contribution towards the Eastern Sewer Trunk Main of $2.87 million, also constructed prior to the funding deed. The total, including the pre deed works, now brings the total project expenditure up to $11.5 million, which is approximately $1 million under the original budget.

A capital contribution towards the Rotorua Wastewater Treatment Plant (WWTP) of $2.660 million has been recognised in the financials. The change in the capital contribution towards the Rotorua WWTP more accurately reflects the increased growth potential for the area in line with the proposed updated District Plan.

The $5.267 million under-spend will be applied as follows;

- Transferred to Hinemoa Point ($0.349 million)
- Transferred to Hamurana/Awahou ($0.578 million)
- Transferred to Gisborne Point/Rotoiti ($0.94 million)
- Transferred to Rotorua Treatment and Disposal ($3.4 million)

Hamurana and Awahou over-spend $5.878 million

To date, a total of $5.850 million was originally planned to be spent, but actual project expenditure project to date is $11.728 million. This over-spend of $5.878 million is a result of progression of works earlier than planned, due to the delay in the Gisborne Point/Hinehopu Sewerage Scheme.

By the end of the project in 2013, it is anticipated that Hamurana Awahou Sewerage Scheme will have cost $0.578 million more than forecast. The 2010/2011 financial year report previously reported an over-spend of $1.62 million; however there are projected cost savings due to the early completion of construction. The $0.578 million over-spend is as a result of the expanded service area, as previously identified in earlier reports.

To cover this over-spend at completion of the Hamurana Awahou scheme, it is requested that the savings made from Rotokawa/Brunswick be transferred to the Hamurana/Awahou Sewerage Scheme.

Table 5 Summary of all lakes funding and expenditure.

Intervention	Total cost of intervention	Total Cost Estimated 2011/2012 (4.7.4 (a))	Work on the intervention to be undertaken in 2011/2012 (4.7.1)	Annual BOPRC contribution	Annual RDC contribution	Crown funding received	Carry forward 2012	Accumulated carry forward including previous years	Actual spend 2011/2012	Total spend to date
Totals	$95,150,000	$16,400,000	N/A	$1,150,000	$7,050,000	$8,200,000	(3,255,929)	$16,619,052	$19,615,973	$48,389,990
BOPRC Projects	$30,350,000	$2,300,000	N/A	$1,150,000		$1,150,000	(526,928)	$5,398,052	$2,786,793	$8,411,990
RDC Projects	$64,800,00	$14,100,000	N/A	0	$7,050,000	$7,050,000	(2,729,000)	$11,221,000	$16,829,000	$39,978,000