Annual Report

2016-2017

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ROTORUA TE ARAWA LAKES PROGRAMME

Bay of Plenty Regional Council, Rotorua Lakes Council and Te Arawa Lakes Trust.
Working as one to protect our lakes with funding assistance from the Ministry for the Environment.

Contents

Purpose 1

Overview 1

Lake Rotorua 2016-2017 1

Lake Rotoehu 2016-2017 3

Lake Rotoiti 2016-2017 3

Lake Ōkāreka 2016-2017 3

Key achievements 5

Rotorua Te Arawa Lakes Annual Water Quality Results 10

Lake Rotorua 13

Lake Rotoehu 17

Lake Rotoiti 19

Lake Ōkareka 21

Actions and Outcomes for Non Deed Lakes 23

Communications and stakeholder engagement update 26

Science update 27

Land Technical Advisory Group 27

Water Quality Technical Advisory Group 27

Environmental modelling **28**

Action Plans and sewage reticulation **28**

Financials **29**

Purpose

The purpose of this document is to report progress against the 2016-2017 Annual Work Programme of the Rotorua Te Arawa Lakes Programme (the Programme), for the year ending 30 June 2017. This report is in accordance with Clause 5.1 and 5.2 of Deed of Funding with the Crown, for the Programme.

In this report, progress made on individual interventions is reported against the Annual Work Programme commitments. The overarching goal of the Deed of Funding Agreement is to meet community aspirations for water quality in the four Deed Funded lakes: Rotoiti, Rotorua, Ōkāreka and Rotoehu. Each of these lakes has a target water quality set by the community in the Bay of Plenty Regional Water and Land Plan. This target water quality is set by Trophic Level Index (TLI) and this report provides an update on the status of water quality across the Rotorua Te Arawa Lakes, against the targets set for all lakes, Deed and non-Deed funded.

While this report focusses on providing all operations and support work undertaken for Deed funded lakes, an update on work on non Deed funded lakes is also provided.

Overview

Lake Rotorua 2016-2017

RLC or BOPRC Annual Plan Budget ($000)	Actual Year To Date Expenditure ($000)	Approved Crown Funding ($000)	Crown Funding Received ($000)	Crown Funding Applied to Date ($000)
7,270	4,612	3,591	2,681	2,309

Excellent progress has been made in a number of initiatives for the Lake Rotorua catchment this financial year. Most significantly, an independent panel held hearings for Plan Change 10 (PC10) from 13 March to 4 May 2017. The recommendations of the independent panel were sent to BOPRC on the last day of this financial year and have subsequently been approved at a Council meeting. PC10 introduces rules for rural properties in the Lake Rotorua catchment, to limit the amount of nitrogen entering Lake Rotorua from land use in order to improve water quality. These rules underpin the land use initiatives underway for Lake Rotorua, which currently are:

- The Incentives Scheme
- The Gorse Programme
- The Advice and Support Service
- The Low Nitrogen Land Use Fund

The Incentives Scheme has been set up to secure decreases in nitrogen discharges with landowners in perpetuity. $40m has been allocated to this initiative which aims to secure 100 tonne of nitrogen per year from entering the lake. So far five agreements have been signed, securing 8.44 tonne. A streamlined process has been put in place for those landowners with only small amounts of nitrogen available and this has attracted four landowners who will now enter negotiations.

The Gorse Programme aims to convert areas of established gorse to trees, providing funding to

landowners for the work and securing the land use change in perpetuity. Although only 2.5 tonne of nitrogen has been secured this year, the aggregated total now sits at 18.5 tonne, which takes the gorse programme over halfway to its target of 30 tonne.

The Advice and Support Service is established to produce and fund Nitrogen Management Plans and provide business decision making support to those landowners affected by PC10 rules for nitrogen discharge restrictions. 126 farming enterprises are now signed up with Advice and Support, and of those farming enterprises with over 40 hectares, 74% are engaged with the service in preparation for the resource consent processes that will start for these enterprises in 2017/2018.

The Low Nitrogen Land Use Fund has initiated the first round of funding this year. Six projects were chosen out of the expressions of interest and five of these have progressed well, providing useful information for landowners. The sixth project has been delayed due to a change in the General Manager, but is expected to proceed in 2017/2018. The next round of funding has been deferred to 2018 to allow the benefits from the first round to be realised.

As well as the land use change initiatives, a range of engineering initiatives are planned to secure 50 tonne of nitrogen from entering the lake annually. The main initiative being planned is the development of the Zeolite Plant at Tikitere, which will use the mineral zeolite to absorb nitrogen in the Tikitere stream before it can enter the lake. Work on this plant has reached the detailed design stage.

The Programme finances showed a large underspend for the interventions in the Lake Rotorua catchment for second year running. The largest underspend related to the Incentives Scheme. Incentives agreements had been signed but not yet paid out by the end of the financial year totalling $660k. In addition, agreements that would have exceeded the remaining $800k budget were in negotiation by the end of the year. The period from initial discussions to the eventual payment is proving to be up to nine months. Other underspends, in total just over $1m, were experienced across a number of initiatives:

- Advice and Support has had a slow start this year, but now that increasing numbers of farming enterprises are enrolling with Advice and Support an underspend in the following year is not expected.
- The Gorse Scheme has also been slow to gain momentum but a number of large gorse blocks are under negotiation and are expected to progress to payment in 2017/2018.
- The remaining sewerage connections for Lake Rotorua are proving difficult to achieve, but an analysis of the properties has been undertaken and a plan has been drawn up.
- One of the Low Nitrogen Land use projects did not progress in this financial year as outlined above.

Financial details can be found in the table at the end of this report.

Lake Rotoehu 2016-2017

RLC or BOPRC Annual Plan Budget ($000)	Actual Year To Date Expenditure ($000)	Approved Crown Funding ($000)	Crown Funding Received ($000)	Crown Funding Applied to Date ($000)
236	214	139	139	107

The long-term interventions for Lake Rotoehu are now complete. The short-term interventions of weed harvesting and alum dosing continue, though during this year there was no weed accessible for harvesting. Investigations are now underway with regard to the potential for including Lake Rotoehu in the sewage reticulation for the Rotoiti/Rotomā treatment plant, which would further decrease the nutrients reaching the lake.

Lake Rotoiti 2016-2017

RLC or BOPRC Annual Plan Budget ($000)	Actual Year To Date Expenditure ($000)	Approved Crown Funding ($000)	Crown Funding Received ($000)	Crown Funding Applied to Date ($000)
1,384	848	695	260	424

The Ohau Diversion Wall was re-consented for a further 35 years during this year. The re-consenting of the wall did not require public notification, so a hearings process, which was budgeted for, was not needed. This accounts for the majority of the underspend for the Lake Rotoiti catchment interventions. The wall will now undergo maintenance in line with the management plan that has been put in place.

The resource consent application for the Rotoiti/Rotomā Wastewater Treatment Plant was lodged this year, with the hearing taking place at the start of 2017/2018. The detailed design work is underway and will be completed in 2017/2018.

Although not managed as part of the Programme, a catfish incursion in Lake Rotoiti has been of concern to the community. Surveys are continuing, but it would appear that the majority of the catfish have now been confined in one of the bays.

Lake Ōkāreka 2016-2017

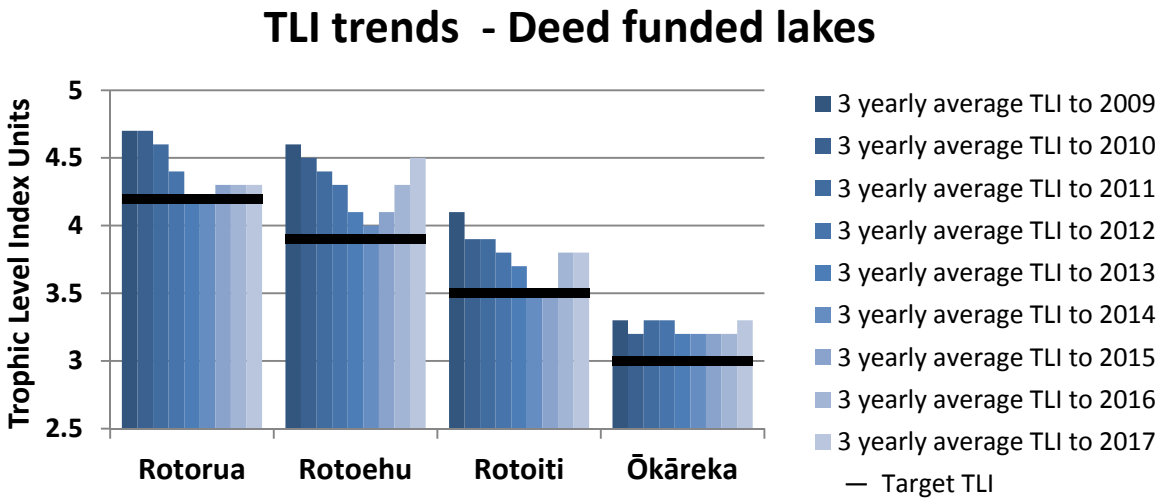
The previous interventions in Lake Ōkāreka consisted of sewage reticulation and land use change, and these have been completed. The Lake Ōkāreka community remains active in its interest in water quality and they are concerned that the lake still exceeds its TLI. In August 2016, the Rotorua Te Arawa Lakes Strategy Group agreed to a further land use change project in the catchment. This was due to encompass the monitoring of the Rule 11 nutrient cap, incentives for land use change and a contribution to the monitoring and review of the Rotorua Lakes Council Lakes "A" section of the District Plan. Whilst the monitoring work has commenced, the Lakes A work is on hold at present, and the lack of a key staff member until the 2017/2018 year has meant that the land use change work has only reached the initial investigation stage.

The Lake Ōkāreka lake level rose rapidly following the weather events in February, March and April and has continued to rise, gradually flooding walkways and gardens. Although not an issue to be tackled by the Programme, this has been a problem that was not going to resolve itself quickly, as the lake has no natural surface outlet. The Regional Council has invoked Section 330 of the Resource Management Act (Emergency Works) to increase the flow through the pipeline taking excess water to Lake Tarawera, and then at the start of 2017/2018, add an additional pipeline and pump more water out.

Overview of TLI results

Five lakes have reached their target TLI with this year's annual average results: Lakes Rotorua, Ōkaro, Rerewhakaaitu, Tikitapu and Rotomā. This is a great improvement over the previous year's results, when only Lake Ōkaro and Lake Rerewhakaaitu reached their target TLI. However the results for four lakes that have not met their target TLI show some declining trends. These lakes are Rotoehu, Ōkataina, Tarawera and Rotoiti.

When looking at trends in the TLI results for the four Deed funded lakes, the three yearly average TLIs are a useful indicator. As can be seen in the chart below, Lake Rotorua is showing a gradual improvement as indicated by the trend towards the TLI dropping. Both Lake Rotoehu and Lake Rotoiti were showing some good progress but have recently moved further away from their target TLI. Land use change and sewerage reticulation for Lake Ōkāreka have not enabled it to reach its TLI, but it shows a very stable trend at either 0.2 or 0.3 TLI units above the target, based on three yearly average TLIs.



Key achievements

The table below sets out key achievements within the Programme as shown against the 2016-2017 Annual Work Programme. Deed funded activities are shown in bold.

Lake Operations Commitments as shown in 2016-2017 Annual Work Programme	Lake Operations Achievements 2016-2017
• **Continue Lake Rotoehu weed harvesting**	• **This was not undertaken during 2016-2017 as there was insufficient accessible weed to be harvested.**
• **Investigate the feasibility of weed harvesting on Lake Rotorua for nitrogen reduction (as part of 50T engineering solutions).**	• **This is being investigated as part of the 50T nitrogen reduction project and a report is underway**.
• **Continue phosphorous locking to maintain water quality (Lakes Rotoehu and Rotorua).**	• **This has continued through the year. The results for Lake Rotorua have been very good, with no algal blooms experienced. However Lake Rotoehu experienced algal blooms despite the alum treatment and a Toi Te Ora health warning was put in place over the summer. There is an ongoing science investigation to assess the efficacy of Lake Rotoehu alum dosing.**
• **Continue to pursue resource consents, prepare site and review engineering and cost feasibility of Tikitere Zeolite Plant in time for scheduled 2018-2019 construction.**	• **The site has been confirmed through geotechnical investigation and the resource consent is in preparation. Detailed design has now started.**
• Responsive weed management as required for amenity purposes across all lakes.	• The only amenity weed harvesting required over the summer period was for Lake Rotoiti.
• Once groundwater information is available for Lake Tarawera, consider next steps, e.g. nutrient budget review.	• The groundwater model and report is now complete. Commencing lake model development, which will confirm the sustainable nutrient targets. Work is also underway with farmers to implement farm environment plans in the greater Tarawera catchment.
• Once catchment and lake modelling completed consider review of action plans for Ōkaro and Ōkāreka to establish whether further intervention is necessary in these catchments, e.g. gorse removal.	• Lake Okaro modelling is on hold due to other priorities. Lake Okareka modelling is progressing and will be reported soon.

• The University of Waikato Chair of Lake Restoration and Management and the Water Quality Technical Advisory Group will continue to provide expert advice and scientific rigour for the Programme.	• The Water Quality Technical Advisory Group has met regularly to provide expert advice. The University of Waikato Chair of Lake Restoration and Management resigned during the year, though he has continued to support the programme whenever possible. The recruitment process for his replacement is underway.
• Land Technical Advisory Group to provide technical support for land use and land management decisions.	• The Land Technical Advisory Group has continued to meet throughout the year, although in a different format of targeted workshops.
• Continue work to refine function of Trout Barrier at Hamurana Springs by investigating options to alleviate algae issues above the barrier and prevent trout from passing above the barrier.	• This project has not gained much traction over the year due to competing priorities and challenges in identifying options.
• Implement any actions to manage the corrosion of the Ohau Wall.	• A management plan has been drawn up and maintenance work will now progress according to the plan.
• **Prepare and lodge consent application for Ohau Wall for a 35 year consent.**	• **The consent was lodged and approved, without requiring public notification.**
• Undertake bathymetric survey of Lakes Tikitapu and Rotokakahi.	• The survey work is completed and data is available for research and modelling work.
• Trial fish pass in Ohau Wall.	• The fish passes are designed and are awaiting RMA compliance approval before installation.
• Monitor forest harvest impact on Lake Rotomā – a four year project.	• This is ongoing for the four year period to assess medium term changes in nutrient leaching.
• Install monitoring buoy in next lake, subject to approvals.	• The buoy was built and is awaiting installation in Lake Rotokakahi
• Continue koura monitoring programme on all twelve lakes.	• Lakes Okaro and Rerewhakaaitu were monitored and reported on during the year.

Land Management as shown in 2016-2017 Annual Work Programme	Land Management Achievements 2016-2017
• **Continue to implement the Lake Rotorua Gorse Programme, including signing up new agreements and implementing existing ones.**	• **Whilst the Gorse programme has had a slow start, a drive to target the larger gorse blocks in the catchment is starting to show results, and an app developed with funding from the Low Nitrogen Land Use Fund is demonstrating the potential gains the gorse programme can provide for individual landowners.**
• **Complete the first funding round for the Low Nitrogen Land Use Fund to support land use and land management change in the Lake Rotorua catchment to low nitrogen alternatives and implement associated contracts.**	• **The first funding round resulted in six projects that reached the criteria for funding. Of these, five have progressed to plan during the year, but the sixth is still in negotiation following a change in General Manager at the organisation proposing the project.**
• **Continue to implement the Lake Rotorua Incentives Scheme, including signing up new agreements and implementing existing ones.**	• **A total of five agreements have now been signed and the total reduction committed to so far is 8.435 T N. Three of the agreements are for land use change in later years. A monitoring process will ensure that the land use change occurs when expected. The remaining two agreements relate to land use change that has already happened and this totals 0.889 T N.**
• **Continue to implement the Advice and Support Service for landowners affected by the rules.**	• **A total of 126 farming enterprises have now signed up to the Advice and Support Service, 42 of those signed up during this year. 60 nitrogen management plans have been signed off and a further 38 are in progress.**
• Continue Acacia control in the Lake Tarawera catchment to reduce nitrogen leaching as required.	• The Acacia control programme took place again in 2016-2017 in the Lake Tarawera catchment and was focused on the area around the isthmus track between Lake Tarawera and Lake Rotomahana. The work involved felling rather than drilling the trees, as that is a Department of Conservation requirement for safety around tracks.
• Build phosphorus detainment bunds as suitable sites are identified.	• No new detainment bunds were developed but five have been scoped and of those two have agreements progressing.
• Continue to support the farming community to implement farm management plans in the Lake Rerewhakaaitu catchment, also continue to support other activities of the group including expansion in to surrounding lake catchments. Important to the Programme here is quantifying the nutrient reductions achieved by the Rerewhakaiitu farming community to date.	• A Project Manager has been contracted to assist farmers to develop farm environmental plans as a first step in this process. The Lake Rerewhakaaitu Incorporated Society has agreed to support the Farm Environment Plan process with the community.

Policy, Planning, Communications and IT as shown in 2016-2017 Annual Work Programme	Land Management Achievements 2016-2017
• Continue Schedule 1 Resource Management Act 1991 process for Lake Rotorua Nutrient Management rules being made operative.	• The Plan Change 10 hearings took place between 13 March and 4 May 2017.
• Identify timeframes for rules to be developed for the 'Non-Rule 11' lakes.	• This work is now encompassed in the Rotorua Water Management Area work. Timeframes are still to be confirmed.
• Continue working with lake owners to develop an action plan for Lake Rotokakahi.	• Action Plan discussions are progressing and are awaiting a response on monitoring requirements.
• Develop action plan for Lake Rotomahana if needed.	• The Lake Rotomahana TLI has not triggered the Programme requirement for an Action Plan. The TLI remains within 0.2 units of the target.
• Continue with the implementation of the Te Arawa Values Framework that was adopted by the Strategy Group in October 2015.	• Changes at the Te Arawa Lakes Trust have resulted in this initiative being delayed to the financial year 2017/2018.
• Implement Communications Plan approved by the Programme, with focus on Integrated Framework, the Resource Management Act process in relation to the Lake Rotorua Nutrient Management package and raising the profile of the Programme.	• The main focus for Communications this year continued to be the Integrated Framework, in particular Proposed Plan Change 10 – Lake Rotorua Nutrient Management. A huge amount of support was required for the RMA process which took place throughout the year. This included media releases, media briefings, updates to affected parties, website updates, emails and letters to affected parties, information collateral. • Key milestones achieved include a growing community on the RTALP Facebook page, an open rate of 50% for the Lakes e-newsletter, front page story for the Dairy News for the first Incentives Deal, positive stories and interview around the adoption of Plan Change 10, regular features in the lakeside community newsletters and the farmers collective newsletter.
• Establish the Nutrient Discharge Management System for nutrient management across all lake catchments.	• This has been delayed and is due now to take place between July and December 2017

Sewerage shown in 2016-2017 Annual Work Programme	Sewerage Annual Achievements 2016-2017
• Lodge resource consent application for Rotorua Wastewater Treatment Plant, alternative Disposal System and Rotoiti Sewerage Scheme.	• Prior to the lodging of the resource consent for the Rotorua Wastewater Treament Plant, community consultation on the land contact bed design (as part of the alternative Disposal System) has been progressing. It is expected that the resource consent will be lodged by the end of 2017. • The resource consent for the Rotoiti Sewerage Scheme was lodged but the hearings were not held until after the end of this financial year.
• **Complete detailed design of Rotomā/Rotoiti Wastewater Treatment Plant and Land Disposal System.**	• **The detailed design work is underway and will be completed in the financial year 2017/2018.**
• Continue community engagement at Rotoehu in relation to sewerage with the aim of agreeing on preferred option.	• Community engagement has continued and there is some interest in a reticulated solution.
• **Complete the remaining sewerage connections at Brunswick, Lake Rotorua**	• **This has not progressed in this financial year as a special consultative process is required, delaying the completion of this initiative until the financial year 2017/2018. In the meantime a report has been developed assessing whether the On-Site Effluent Treatment rules could help to encourage the remaining 55 households to connect to the sewerage reticulation.**

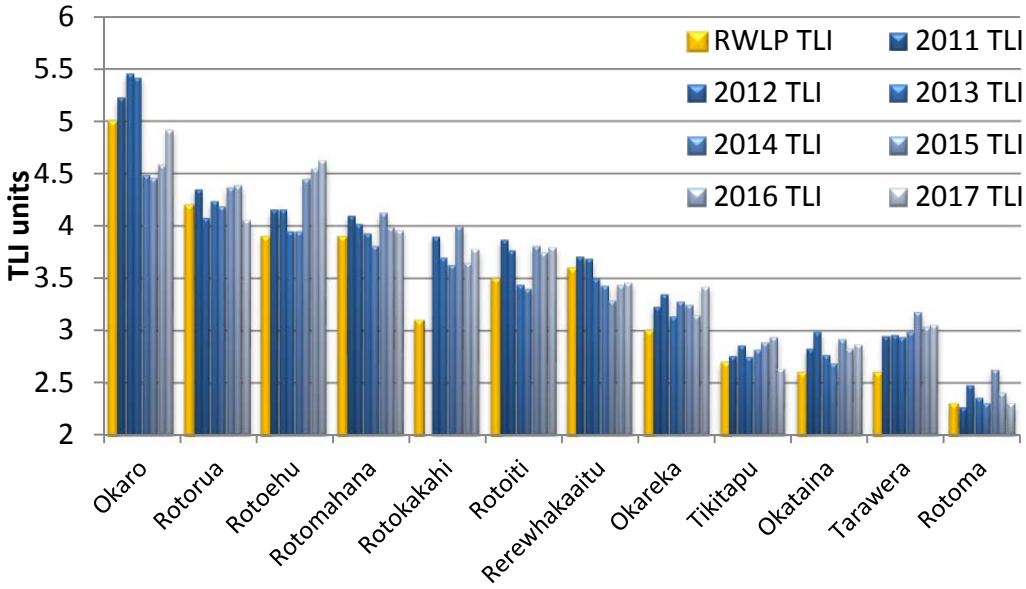
Rotorua Te Arawa Lakes Annual Water Quality Results

Currently five of the twelve Rotorua Te Arawa Lakes meet or are below the RWLP TLI objective. Lakes Rotorua, Okaro and Tikitapu have benefited from the results of restoration activities resulting in meeting community objectives for lake water quality as stated in Objective 11 of the RWLP. Lake Rotoehu and Lake Tarawera continue to show some declining water quality trends resulting in increasing trophic level indices.

Blue-green (cyanobacteria) blooms resulted in health warnings being issued by Toi Te Ora for Lakes Rotoehu and Ōkaro. Lakes Rotoiti, Tarawera and Rotorua reached amber alert levels for some sites over the 2016-2017 summer.

The chart below shows the Regional Water and Land Plan (RMLP) TLI objectives and average annual TLI results, 2011 to 2017.

Note: Lake Rotokakahi TLIs are based on Te Wairoa Stream monitoring and a three-parameter TLI (no Secchi).



The table below summarises the TLI data for the Rotorua Lakes for the period July 2016 to June 2017.

Three-yearly average TLI values, 2016-2017 annual TLI, trophic status and LakeSPI condition for the Rotorua Lakes.

Lake *Regional Water & Land Plan Objective* *TLI units*	3-yearly average TLI to 2015 *TLI units*	3-yearly average TLI to 2016 *TLI units*	**3-yearly average TLI to 2017** ***TLI units***	2014/15 Annual TLI *TLI units*	2015/16 Annual TLI *TLI units*	**2016-17 Annual TLI**	Comply with target TLI?	Lake Type *based on Trophic Status*	LakeSPI Condition 2014/2015[1]
Ōkaro **5.0**	4.8	4.6	**4.7**	4.6	4.6	**4.9**	YES	Eutrophic	Moderate
Rotorua **4.2**	4.3	4.3	**4.3**	4.4	4.4	**4.1**	YES	Eutrophic	Moderate
Rotoehu **3.9**	4.1	4.3	**4.5**	4.5	4.6	**4.6**	NO	Eutrophic	Poor
Rotomahana **3.9**	3.9	3.9	**4.0**	4.0	4.0	**4.0**	NO	Mesotrophic	High
Rotoiti **3.5**	3.5	3.8	**3.8**	3.7	3.8	**3.8**	NO	Mesotrophic	Poor
Rerewhakaaitu **3.6**	3.4	3.4	**3.4**	3.3	3.4	**3.5**	YES	Mesotrophic	Moderate
Okareka **3.0**	3.2	3.2	**3.3**	3.3	3.2	**3.4**	NO	Mesotrophic	High
Tikitapu **2.7**	2.8	2.9	**2.8**	2.9	2.9	**2.6**	YES	Oligotrophic	Moderate
Ōkataina **2.6**	2.8	2.8	**2.8**	2.8	2.8	**2.9**	NO	Oligotrophic	Moderate
Tarawera **2.6**	3.0	3.0	**3.1**	3.1	3.0	**3.1**	NO	Oligotrophic	Moderate
Rotoma **2.3**	2.4	2.4	**2.4**	2.5	2.4	**2.3**	YES	Oligotrophic	High
*Rotokakahi** ***3.1***	*3.8*	*3.8*	*3.8*	*4.0*	*3.7*	***3.8***	NO	Mesotrophic	Moderate

*Italicised figures are based on Te Wairoa Stream monitoring and a three-parameter TLI (no Secchi disk).

Of the 12 Rotorua lakes in the programme, tracking of the water quality shows:

- Lake Ōkaro is at the target level but shows a recent decline
- Water quality continues to improve in Lake Rotorua with the lake reaching its RWLP objective. The lake still remains vulnerable to climatic conditions and a possible decline in water quality in response to longer duration of summer stratification
- Lake Rotoehu continues to decline after initially showing improvement over many years. Like Lake Rotorua it is vulnerable to climatic conditions and longer stratification events
- Lake Rotoiti had shown a long-term improvement in water quality since the peak TLI results of 2003 and also since the installation of the Ōhau Diversion Wall, however the TLI has declined in the past few years
- The water quality of Lake Ōkāreka has shown a recent decline, although oxygen demand in the bottom waters is stable
- Lake Tikitapu showed a sudden improvement in water quality
- The water quality is stable in Lakes Ōkataina, Rerewhakaaitu and Rotomahana

[1] NIWA (2015). Assessment of the Rotorua Te Arawa lakes using LakeSPI – 2015.

- There is deteriorating water quality in Lake Tarawera
- After a rapid decline until 2010, Lake Rotokakahi has shown improvement but remains vulnerable and continues to exceed its TLI target

Lake Rotorua

To meet community expectations for Lake Rotorua, nitrogen inputs to the lake need to reduce to 435 tonne of nitrogen per year and approximately 30 tonne of phosphorus.

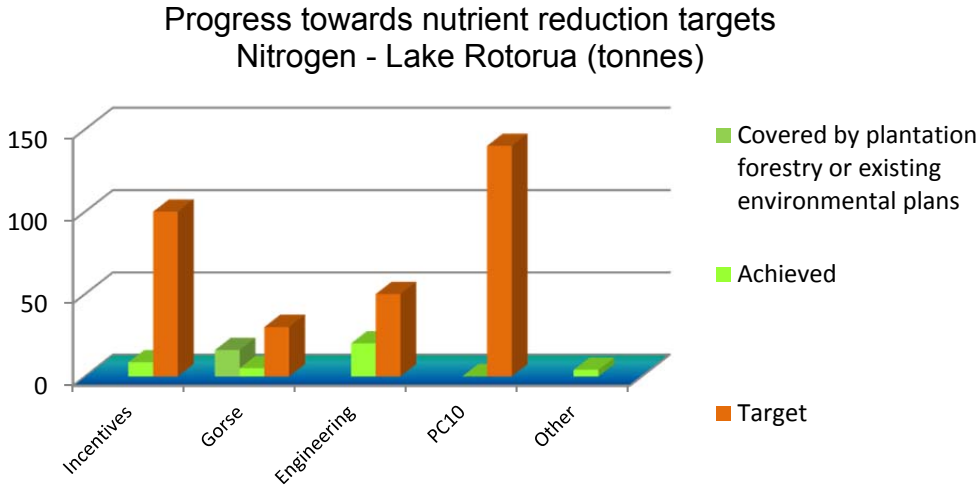
To achieve these water quality targets for Lake Rotorua, we are undertaking both short-term and long-term interventions. The short-term intervention of phosphorus locking (alum dosing) has resulted in the lake now having a lower annual average TLI than the target TLI. The long-term interventions will eventually bring the improvements needed, so that alum dosing can cease. The Integrated Framework provides for various long-term interventions that will eventually decrease the nitrogen entering the lake by a total of 320 tonne per year - the decrease required to reach the target of 435 tonne. The 320 tonne comprises 100 tonne from the Incentives Scheme and 30 tonne from the Gorse Scheme, both of which will run until 2022. Engineering interventions are expected to account for a decrease of 50 tonne and reductions in the farming community will in time total 140 tonne, driven by the Regional Council's Plan Change 10 rules regarding nutrient leaching.

Water quality at a glance:

2017 TLI	**4.1**
2016 TLI	**4.4**
2015 TLI	**4.4**
Target	**4.2**

The annual average TLI for Lake Rotorua has now reached 4.1, which is below the target TLI of 4.2. Although total nitrogen concentrations were higher than the previous year, this was offset by a marked decrease in total phosphorus, a decrease in chlorophyll-a and improved in water clarity.

Cyanobacteria levels remained relatively low, which was similar to the previous summer. Amber alerts were in place in late January and early February, but no health warnings were required this year.



Programme Update – Lake Rotorua						
Project	**Deed Funded**	**Total Target**	**Annual Target**	**Annual Result**	**Update**	**Project Status**
LAND USE CHANGE						
Lake Rotorua Regional Water and Land Plan - Proposed Plan Change 10 (including Advice and Support and Low Nitrogen Land Use Fund)	Yes	140 T N	0 T N	0 T N	Advice and Support and the Low Nitrogen Land Use Fund are progressing well, and the proposed Plan Change went through an independent hearing this year, with the panel's report received by BOPRC on the last day of the year. No benefits accruing to these initiatives will be counted until 2022, when the first targets must be met.	
Incentives	Yes	100 T N	No target set	8.44 T N	The Incentives Scheme is now starting to gain pace as more landowners are choosing to start negotiations with the staff. During the year, five agreements were signed, and several others are in the negotiation stage. Note – the annual result counts all the agreements that are committed, though some of the agreements are for land use change at a set future date.	
Gorse	Yes	30 T N	7.0 T N	2.5 T N	Whilst the annual target has not quite been met, an analysis of all agreements or land use changes that manage gorse has shown that we have already converted gorse equating to 16 T N in previous years of the Programme.	
Nutrient Agreements (non-incentives)	No	N/A	3.94 T N 0.08 T P	3.94 T N 0.08 T P	Secured in previous years. Subject to monitoring to ensure compliance.	
Total		**270 T N**	**10.94 T N** **0.08 T P**	**14.88 T N** **0.08 T P**		

Programme Update – Lake Rotorua						
Project	**Deed Funded**	**Total Target**	**Annual Target**	**Annual Result**	**Update**	**Project Status**
ENGINEERING SOLUTIONS						
Sewerage Reticulation (excluding Brunswick connections)	Yes	9.74 T N 0.80 T P	9.74 T N 0.80 T P	9.74 T N 0.80 T P	Completed in prior years	
Brunswick connections to reticulation	Yes	0.67 T N 0.06 T P	0.67 T N 0.06 T P	0 T N 0 T P	This has not progressed in this financial year as a special consultative process is required, delaying the completion of this initiative until the financial year 2017/2018.	
Tikitere Zeolite Plant	Yes	20-25 T N	N/A	N/A	This engineering project has reached the detailed design stage	
P-locking Utuhina and Puarenga (Alum Dosing)	Yes	As required	As required	8.96 T P	The alum dosing has continued on an as needed basis, with the dosage adjusted as necessary. This intervention is required to continue in the short term to ensure the TLI of the lake does not rise, and needs to continue until the longer term solutions start to show more benefits. Lake Rotorua has had no algal blooms during this year.	
Floating Wetlands	No	0 T N 0 T P	0 T N 0 T P	0.18 T N 0.03 T P	Completed in prior years.	
Detainment Bunds	No	0 T P	0 T P	0.02 T P	Completed in prior years.	

Programme Update – Lake Rotorua						
Project	**Deed Funded**	**Total Target**	**Annual Target**	**Annual Result**	**Update**	**Project Status**
Rotorua Wastewater Treatment Plant Alternative Disposal	No	0 T N 0 T P	0 T N 0T P	0 T N 0 T P	Preparation for the resource consent application is underway and a matauranga mauri approach to the land contact beds is under consultation with the public	
Total		**50 T N**	**10.41 T N** **0.86 T P**	**9.92 T N** **9.81 T P**		
Grand Total		**320 T N**				

Project status: **Green** = on track, **Amber** = some delays, **Red** = major delays.

Lake Rotoehu

To meet community expectations for water quality in Lake Rotoehu, nitrogen inputs to the lake need to reduce by 8.8 tonne of nitrogen and 0.7 tonne of phosphorus on an annual basis. The short-term intervention of alum dosing continues and weed harvesting progresses when needed. The main long-term intervention on this lake has been land use change, and two land use change agreements were made previously that are expected to eventually cover the nitrogen reduction target. Monitoring of these land use changes continues.

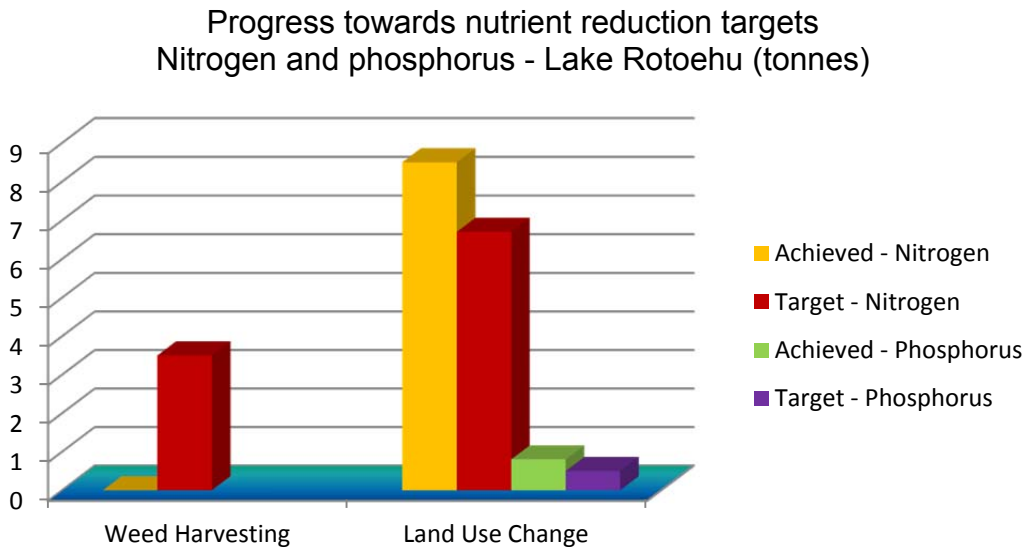
Discussions are also underway with regard to including Lake Rotoehu residences in the sewage reticulation scheme for Lakes Rotoiti and Rotomā.

Water quality at a glance:

2017 TLI	**4.6**
2016 TLI	**4.6**
2015 TLI	**4.5**
Target	**3.9**

The annual average TLI for Lake Rotoehu remains 0.7 units above the target TLI for the second year running, and the three year average has now increased from a TLI of 4.3 last year to 4.5 this year. The average annual phosphorus concentrations decreased this year, but the water clarity decreased.

Cyanobacteria concentrations were at red alert levels for much of the summer and into the autumn. This resulted in a health warning being placed on the lake by Toi Te Ora from early summer to late April 2017.



Project	Deed funded	Total target	Annual Target	Annual Result	Update	Project Status
Land use and land management change	Yes	6.69 T N 0.46 T P	6.69 T N 0.46 T P	8.45 T N 0.81 T P	Existing nutrient agreements are being monitored. Figures shown here are reductions at the root zone, i.e. nutrient loss of the land use activity as measured by OVERSEER.	
Weed harvesting	Yes	3.5 T N 0 T P	3.5 T N 0 T P	0 T N 0 T P	No weed harvesting was possible this year as any weed was situated in inaccessible places.	
P-locking Soda Springs (Alum Dosing)	Yes	As required	As required	3.13 T P	This has been continuing on an as-needed basis, but despite the alum dosing this lake has had algal blooms during the year.	
Floating wetland	Yes	0 T N 0T P	0 T N 0 T P	0.05 T N 0.01 T P	Completed in prior years.	
Total		**10.19 T N** **0.46 T N**	**10.19 T N** **0.46 T N**	**8.50 T N** **3.95 T P**		

Project status: **Green** = on track, **Amber** = some delays, **Red** = major delays.

Lake Rotoiti

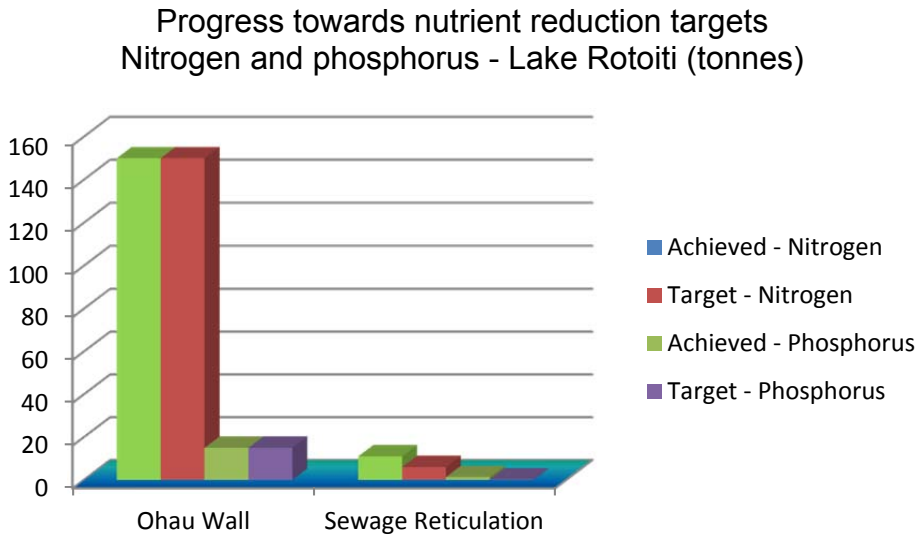
To meet community expectations for water quality, nitrogen inputs to Lake Rotoiti need to reduce by 130 tonne annually and phosphorus inputs by 19 tonne annually. The Ohau Diversion Wall was put in place in 2008 to protect Lake Rotoiti's water quality by diverting water from Lake Rotorua straight to the Kaituna River outlet. A maintenance plan is in place for the wall and repair of corrosion areas will be undertaken. The resource consent for the wall has been agreed for a further 35 years.

Water quality at a glance:

2017 TLI	**3.8**
2016 TLI	**3.8**
2015 TLI	**3.8**
Target	**3.5**

Lake Rotoiti's annual average TLI remains above the target TLI for the third year running, which has meant that the three year average dropped from 3.62 last year to 3.8 this year.

Whilst the total nitrogen marginally decreased, the total phosphorus increased. Water clarity decreased, but chlorophyll-a concentrations showed some improvement over previous years.



Project	Deed Funded	Total Target	Annual Target	Annual Result	Update	Project Status
Sewerage Scheme (including Curtis Road to Hinehopu)	Yes	4.9 T N 1.1 T P	0 T N 0 T P	0 T N 0 T P	The resource consent application was not heard until after the end of this financial year.	
Ohau Diversion Wall	Yes	150 T N 15 T P	150 T N 15 T P	150 T N 15 T P	The Ohau Diversion Wall was re-consented this year for a further 35 years. A maintenance programme is in place to ensure that that the wall does not deteriorate.	
Completed Rotoiti Reticulation: Okere, Otaramarae, Whangamarino, Mourea, Okawa Bay	Yes	5.9 T N .21 T P	5.9 T N .21 T P	5.9 T N .21 T P	No further works required in 2016-2017	
Total		**160.8 T N** **16.31 T N**	**155.9 T N** **15.21 T P**	**155.9 T N** **15.21 T P**		

Project status: **Green** = on track, **Amber** = some delays, **Red** = major delays.

Lake Ōkareka

To meet community expectations for water quality annual nutrient reductions of 2.5 tonnes nitrogen and 80kg of phosphorus are required. Despite the work to complete the actions in the Lake Ōkāreka Action Plan, the lake has remained above its target TLI and is now 0.4 units above that target.

A further land use change project has been initiated and initial investigation have been undertaken, but the main work to secure further land use change will progress in 2017/2018. Work to monitor the Rule 11 nutrient cap started in December 2016 and will continue into 2017-2018.

Water quality at a glance:

2017 TLI	**3.4**
2016 TLI	**3.2**
2015 TLI	**3.3**
Target	**3.0**

The annual average TLI for Lake Ōkāreka has increased to 3.4 and so now sits at 0.4 units above the target TLI. All components of the TLI measure showed an increase this year.

The three year average TLI also shows a rise this year, from 3.15 last year to 3.3 this year.

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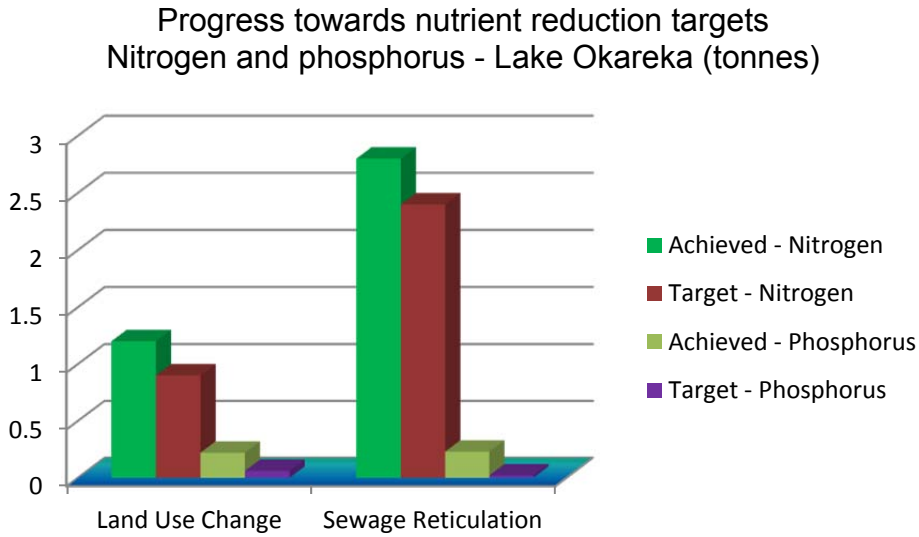

Project	Deed Funded	Total Target	Annual Target	Annual Result	Comments	Project status
Sewerage Reticulation	Yes	2.40 T N 0.02 T P	2.40 T N 0.02 T P	2.83 T N 0.23 T P	Project complete.	
Land Use Change	Yes	0.90 T N 0.06 T P	0.90 T N 0.06 T P	1.18 T N 0.22 T P	Project complete.	
Total		**3.30 T N** **0.08 T P**	**3.30 T N** **0.08 T P**	**4.01 T N** **0.45 T P**		

Actions and Outcomes for Non Deed Lakes

Lake Tikitapu	
2017 TLI 2.6 2016 TLI 2.9 2015 TLI 2.9 Target 2.7	The trend for Lake Tikitapu was showing a gradual but slight decline in the annual TLI results, but this year showed a significant improvement and the lake now exceeds its target TLI for the first time since 1996. An almost two metre increase in annual average water clarity was the main driver for the TLI improvement. The three year average TLI also dropped slightly, from 2.88 in 2015-2016 to 2.82 this year.
Lake Ōkataina	
2017 TLI 2.9 2016 TLI 2.8 2015 TLI 2.8 Target 2.6	Lake Ōkataina's annual average TLI increased slightly this year. A decrease in water clarity, which had improved by over a metre in 2015-2016, and an increase in chlorophyll-a were the main factors in the TLI increase. This lake is now 0.3 units above its target TLI and a watching brief will be kept on the lake The PhD study by the University of Waikato on the lake is complete and the final report is awaited.
Lake Ōkaro	
2017 TLI 4.9 2016 TLI 4.6 2015 TLI 4.5 Target 5.0	For the fourth year in succession the annual average TLI for Lake Ōkaro has remained below the target TLI, however the lake does show a marked decline this year. This was driven by a bloom event in September 2016 which saw an increase in nitrogen, phosphorus and chlorophyll-a. In addition, water clarity has been on average 40 centimetres less than the previous year. Cyanobacteria were present at amber alert levels when summer monitoring began in November 2016. Red level alerts were reached for a few weeks in December and January and again in February, resulting in a health warning being issued by Toi Te Ora. The blooms ceased in March 2017.

Lake Rotomā	
2017 TLI 2.3 2016 TLI 2.4 2015 TLI 2.6 Target 2.3	The only outstanding intervention for Lake Rotomā is sewage reticulation, which is progressing as outlined above. The lake reached its target TLI this year, and the drop in TLI was largely due to a decrease in phosphorus levels. Chlorophyll-a levels were the lowest observed since 1996. A four year study is continuing to understand the effects of forest harvesting on phosphorus in the lake.
Lake Rerewhakaaitu	
2017 TLI 3.5 2016 TLI 3.4 2015 TLI 3.3 Target 3.6	Lake Rerewhakaaitu remains below its target TLI with both the annual average TLI and the three year average TLI (3.4). The Programme has contracted a Project Manager to work with farmers to develop Farm Environmental Plans as one of the first actions as part of the Catchment Management Plan. The Lake Rerewhakaaitu Incorporated Society is encouraging the community to work with the Project Manager. Nitrogen levels in this lake continue to show a decline over the last nine years.

Lake Tarawera	
2017 TLI 3.1 2016 TLI 3.0 2015 TLI 3.1 Target 2.6	Lake Tarawera's annual average TLI has deteriorated slightly since the previous year and is now 0.5 units above the target TLI. Annual average nitrogen concentrations increased to the highest in eight years, though the annual average water clarity has improved compared to the previous five years. Cyanobacteria levels triggered amber alerts at Hot Water beach in January through to March and an amber alert was also in place for Stoney Point for three weeks from the end of January into February, but no health warnings were necessary in the last season. Acacia control took place in the catchment this year as in previous years.
Lake Rotokakahi	
2017 TLI 3.8 2016 TLI 3.7 2015 TLI 4.0 Target 3.1	The annual average TLI for Lake Rotokakahi (measured at the outflow) remains considerably above its target TLI. No cyanobacteria blooms were observed over the summer months. Phosphorus concentrations remained stable but nitrogen showed an increase. Staff continue to work with the private lake owners to develop an action plan.
Lake Rotomahana	
2017 TLI 4.0 2016 TLI 4.0 2015 TLI 4.0 Target 3.9	Lake Rotomahana's annual average TLI remains just slightly above its target TLI. Phosphorus concentration increased slightly from the last year and water clarity decreased slightly. As yet the lake has not exceeded the trigger for the development of an action plan.

Communications and stakeholder engagement update

The main focus for Communications this year continues to be the Integrated Framework. However, there has been a shift from letting people know about the rules to informing them of the other parts of the programme that are in place to achieve the aspirations of our community with regards to water quality.

Highlights of activity that occurred:

- **Media results –** media releases and pitches prepared generated good coverage from a combination of local and national media. Key stories were around the first Incentives deal which was on the cover of Dairy News Weekly and projects awarded funding under the Low Nitrogen Land Use Fund.

- **Plan Change 10 -** development of materials, preparation of media releases, media briefings etc for the hearings process and Advice & Support available for affected landowners.

- **State of our Lakes –** this event attracted over 150 people as Professor David Hamilton presented his farewell lecture. It was a great way to share knowledge with the community. It was also filmed, posted on Facebook and shared by many.

- **Facebook** - ongoing activity on the Programme Facebook page. The page grew from 1,290 likes to 1,760 likes. The page has been a helpful tool to engage with an audience that isn't affected by the work that we do but benefit from the outcomes of clean water. We ran a #loveourlakes Rock Hunt which helped share some of the activities we carry out such as the Gorse Conversion Programme, Weed Harvesting and Koura Monitoring. We also ran a Winter Walks competition where followers could share photos of the lake while out for a walk.

- **Low Nitrogen Land Use Fund** - the Low Nitrogen Land Use Fund was launched in the past year and we received a huge amount of interest from applicants and also media around the successful projects such as dNITRO tool, the hazelnut project and good management practice videos. This will continue in to the next year as more projects are publicly launched.

- **Guide for lifestyle blocks** – this guide was developed to provide information on nutrient management best practices for smaller lifestyle block owners who will not need to make changes to their land use under PC10. It is due to be launched before the end of October 2017.

- **Community newsletters –** regular contributions are made and published by the Lake Rotoiti, Lake Ōkāreka and Collective e-newsletters as well as BOPRC e-newsletters Freshwater Flash and Komiti Māori panui. This is a helpful way to reach key stakeholders affected by our work.

- **E-newsletter –** our very own Lakes e-newsletter has around 500 subscribers and an average opening rate of 54% which is an excellent result. An open rate of 20% is generally considered good for government organisations.

Science update

The Rotorua Lakes Science Plan outlines the existing Science Programme, identifies information gaps and provides a clearer picture of the future research needs.

The Science Plan has a foundation of long-term monitoring managed by BOPRC staff as part of the NERMN[2] Monitoring Programme. The University of Waikato (UoW) along with other Crown Research Institutes and consultants are key service providers within the plan. They provide strategic direction for science research as well as undertaking the research needs.

The plan outlines current research, a method for identifying new restoration solutions and the direction for new research as our restoration work on the lakes progresses. One of the most significant changes signalled in the plan is the increased focus on long-term catchment land use and the need for science and economic advice in that area to support management decisions and Council policy formulation for rule development.

With the formation of the Land Technical Advisory Group, information gaps and research needs for land use to support policy and incentives have been developed.

Land Technical Advisory Group

To provide strategic and technical advice on land-based nutrient management solutions for water quality, a Land Technical Advisory Group (Land TAG) has been established.

The Land TAG provides independent technical science and economics advice on existing and new catchment land uses, their effects on water quality and how to mitigate them. The work of the Land TAG has been reviewed to identify better ways of identifying issues and finding alternative solutions. The Land TAG now operates on the basis of targeted workshops where specific expertise is brought in to address particular land management issues.

The direction, support and advice provided by the Land TAG have been instrumental for the implementation of the Lake Rotorua Incentives Scheme. Most recently Land TAG was engaged in a workshop on phosphorus management and loss from land use.

Water Quality Technical Advisory Group

The Water Quality Technical Advisory Group (WQTAG) continued to meet to review science aspects of the programme. The main work of the WQTAG over the past year included:

- Model updates for Lakes Rerewhakaaitu, Tarawera, Okareka and Rotoiti
- Review of alum efficacy from the alum dosing plants
- Management of the high frequency monitoring buoys, including additional buoys to lakes Rotokakahi and Rerewhakaaitu
- Catchment nitrogen modelling for Lake Rotorua, through the ROTAN[3] model
- The impact of the Ohau diversion wall on Lake Rotoiti, as part of the re-consenting project
- Advice and support via the University of Waikato and NIWA to PC10 hearings

[2] National Environmental Regional Monitoring Network
[3] Rotorua Taupō Nitrogen Model

- Design of phytoplankton nutrient limitation work on Lake Rotorua
- Commenced position paper on aquatic plants in the Rotorua Te Arawa Lakes as advice for the programme and community
- Commenced discussion on climate change impact for the Rotorua Lakes, with the objective of providing advice for the programme and community
- Commenced the science review required by PC10

Environmental modelling

Environmental modelling is an important part of the science supporting the programme. During 2016-2017, the modelling from the following projects was used to support PC10:

- Assessing the Effects of Alum Dosing two Inflows to Lake Rotorua against external nutrient load reductions: model simulations for 2001-2012
- Predicting nitrogen inputs to Lake Rotorua using ROTAN-Annual
- Updated Lake Rotorua nutrient budget based on updated OVERSEER files

Other projects included:

- Progressed catchment and lake modelling of Lake Ōkāreka
- Completed the groundwater model report for the greater Tarawera Catchment
- Progressed the Lake Rerewhakaaitu model

Action Plans and sewage reticulation

The programme continues to provide science input to Action Plan implementation and sewage treatment and reticulation projects. Implementation of actions includes the on-going approvals for operation such as the Ohau Diversion Wall and the three alum dosing plants. The Ohau wall has obtained resource consent for 35 years and this process was supported by the science team at UoW to establish the impact on water quality as well as fisheries of the diversion wall. The alum dosing plants as well as the dosing at Lake Ōkaro are reliant on science investigations to ensure effective and efficient application of alum as well as ensuring environmental safety from the dosing programme.

The science team also has an input into the sewage treatment and reticulation through the steering groups and technical advice.

Financials

Rotorua Te Arawa Lakes Programme - Report C

Draft - CFO Forum Financial Detailed Statement - Year End Report 2016/17 (July to June 2017)

Clause 5.2 / 5.4.2 (e) Interventions	(A) Council Annual Plan Budget	(B) Actual expenditure to date 2016/17	(C) Remaining forecast expenditure to year end	D = (B+C) 5.2.2 a Total actual + forecast Expenditure to year end 2016/17	E = (A-D) Forecast variance to Annual Plan 2016/17 over/(under) spend	Year end forecast under/overspend status	(F) Council funding 5.2.2 C (i) Council funding	Council reserve	(G) Crown Funding 5.2.2 D Forecast Annual Work Programme Crown Funding 2016/17	Programme reserves MfE surplus / (deficit)	Reserve interest received	(H) Funding from any other sources	(I) Total funding required	(J) = (-A-I) Total Programme surplus (deficit)	5.4.2 (e) Forecast Funding committed to deferred works
Lake Rotoehu	$000	$000	$000	$000	$000		$000	$000	$000	$000	$000	$000	$000	$000	$000
Weed Harvesting	100	7	0	7	(93)	Underspend	2	2	50	47	0	0	7	(93)	0
Land Management Change	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Phosphorus Locking Soda Springs	136	207	0	207	71	Overspend	52	52	89	(15)	0	0	207	71	0
Aeration	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Sediment capping	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Wetlands	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Total Lake Rotoehu	**236**	**214**	**0**	**214**	**(22)**		**54**	**54**	**139**	**32**	**0**	**0**	**214**	**(22)**	**0**
Lake Ōkāreka															
Sewerage Reticulation	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Land Management Change	0	6	0	6	6	Overspend	2	2	0	(3)	0	0	6	6	0
Outlet Structure	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Total Lake Ōkāreka	**0**	**6**	**0**	**6**	**6**		**2**	**2**	**0**	**(3)**	**0**	**0**	**6**	**6**	**0**
Lake Rotorua															
Advice and Support	501	176	0	176	(325)	Underspend	44	44	250	162	0	0	176	(325)	0
Phosphorus Locking	750	631	0	631	(119)	Underspend	158	158	375	59	0	0	631	(119)	0
Tikitere Diversions	150	353	0	353	203	Overspend	88	88	81	(95)	0	0	353	203	0
Gorse	547	139	0	139	(408)	Underspend	35	35	225	156	0	0	139	(408)	0
Wetlands	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Land Incentive Payments	4,000	2,509	0	2,509	(1,491)	Underspend	627	627	1,250	(4)	0	0	2,509	(1,491)	1,664
Land Incentive Board Administration	500	449	0	449	(51)	Underspend	112	112	250	26	0	0	449	(51)	0
Low Nitrogen Land Use Fund	501	349	0	349	(153)	Underspend	87	87	250	76	0	0	349	(153)	0
Sewerage Reticulation	320	6	0	6	(314)	Underspend	2	2	0	(3)	0	0	6	(314)	0
Total Lake Rotorua	**7,270**	**4,612**	**0**	**4,612**	**(2,658)**		**1,153**	**1,153**	**2,681**	**375**	**0**	**0**	**4,612**	**(2,658)**	**1,664**
Lake Rotoiti															
Sewerage Reticulation	870	779	0	779	(91)	Underspend	195	195	0	(390)	0	0	779	(91)	3,954
Ohau Wall Reconsenting	514	69	0	69	(445)	Underspend	17	17	260	225	0	0	69	(445)	0
Total Lake Rotorua	**1,384**	**848**	**0**	**848**	**(536)**		**212**	**212**	**260**	**(164)**	**0**	**0**	**848**	**(536)**	**3,954**
Rotorua District															
Treatment and Disposal	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0
Total Rotorua District	**0**	**0**	**0**	**0**	**0**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total Programme - Expenditure	**8,890**	**5,680**	**0**	**5,680**	**(3,210)**		**1,420**	**1,420**	**3,080**	**240**	**0**	**0**	**5,680**	**(3,210)**	**5,617**
Programme Expenditure by Council including interest															
Rotorua Lakes Council	1,190	785	0	785	(405)	Underspend	196	196	0	(393)	83	0	785	(322)	3,954
Bay of Plenty Regional Council	7,700	4,895	0	4,895	(2,805)	Underspend	1,224	1,224	3,080	632	31	0	4,895	(2,774)	1,664
Total Programme	**8,890**	**5,680**	**0**	**5,680**	**(3,210)**		**1,420**	**1,420**	**3,080**	**240**	**114**	**0**	**5,680**	**(3,096)**	**5,617**
Funding by Authority including interest															
MfE	4,445	2,840	0	2,840	(1,605)		0	0	3,080	0	114	0	125	0	
Rotorua Lakes Council	595	393	0	393	(203)		196	196	0	0	0	0	0	0	
Bay of Plenty Regional Council	3,850	2,448	0	2,448	(1,403)		1,224	1,224	0	0	0	0	0	0	
Total Funding by Authority	**8,890**	**5,680**	**0**	**5,680**	**(3,210)**		**1,420**	**1,420**	**3,080**	**0**	**114**	**0**	**125**	**0**	