



# Science Plan January 2014



Proud Partners



## Document Control

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### Document Approval

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## 1. Introduction and Background

The Rotorua Te Arawa Lakes Programme (RTALP) is a \$200m Programme of protection and restoration for twelve (12) Lakes in the Rotorua District. The Programme was initiated in 2000 with the development of the Strategy for the Lakes of the Rotorua District. The priorities to date have been the most degraded Lakes: Ōkaro, Rotoehu, Rotorua, and Ōkāreka. The focus is now gradually moving to other less degraded Lakes; the impact of land use change and defining the science behind some of our successes such as alum dosing.

Science monitoring initially commenced in the early 1960's particularly for Lakes Rotorua and Rotoiti, as water quality deterioration was recognised at that time by the community for Lake Rotorua. Since the 1960's, a significant science effort has been undertaken to monitor the quality of the twelve (12) Lakes in the district. A step change in water quality for many of the Lakes in the 1990's prompted more regular monitoring. The Bay of Plenty Regional Council (BOPRC) has been undertaking intensive monitoring of Lakes since 1990 under the regional NERMN Programme.

The 2000 Strategy for the Lakes of the Rotorua District was initiated by BOPRC, Rotorua District Council (RDC), and the Te Arawa Māori Trust Board as a response to the decline in water quality of many of the Lakes in the district. It initiated a Programme of co-operation between the three (3) parties and is now written into the Te Arawa Lakes Settlement Act 2006. The strategy was reviewed in 2013. Soon after the development of the 2000 strategy, it was recognised that the RTALP would benefit from a focused research effort and an agreement to fund the Chair in Lakes Management and Restoration was signed in 2002. The success of this agreement has resulted in the continuation for a further five (5) year period in 2007, and again in 2012.






A number of other science providers are engaged in the Programme, including scientists from BOPRC, Crown Research Institute and various independent consultants. These providers form the Water Quality Technical Advisory Group (WQTAG) and convene 3 - 4 times per year to provide science advice, critique, and direction. More details on this group are provided in Science Groups within Programme. It is of value to note, some of the scientists involved, have been associated with the research and advice on the Rotorua Lakes since the 1980's and so there is a valuable source of knowledge and continuity since that time.

Although the RTALP was initiated in 2000 in response to declining water quality, the quality of our lakes range from some very high quality water to some eutrophic and super trophic Lakes. The objectives of the strategy were not only to restore poor quality water but also to halt the decline of those still in a good state. The vision of the RTALP is the following:

***“The lakes of the Rotorua district and their catchments are preserved and protected for the use and enjoyment of present and future generations, while recognising and providing for the traditional relationship of Te Arawa with their ancestral lakes.”***

The vision is an important focus of the science plan. It is considerably more encompassing than simply addressing the quality concerns. It is also of merit to note that various parts of the groups within our community identify different values for the lakes. Initially the focus of the science work has been on the water quality; however, in recognition of these other values, the science focus is widening, to include a larger range of science, monitoring, research, and advice.

The science work now encompasses:

-  Lakes water quality, monitoring and restoration
-  Ecological monitoring and restoration
-  Land use monitoring and restoration
-  Water and land modelling and interventions for improvement
-  Monitoring of some cultural health indicators

The quality of the science effort is well demonstrated with results that have been spectacularly achieved for the Programme. For the RTALP's water quality, targets have been defined by the community and now reside in the Regional Water and Land Plan. These targets refer to the lakes Trophic Level Index (TLI). The TLI is a single number representing water quality in each lake, derived from four water quality parameters: water clarity, chlorophyll- $\alpha$ , total nitrogen and total phosphorus. The use of a single annual indicator number assists in portraying lake restoration progress in a community friendly average. Notably, Lake Rotoiti is now at its target TLI; Lakes Rotorua, Rotoehu, and Tikitapu are effectively at their target TLI. Research and work on Lake Ōkaro has a reduced TLI from a peak of 6 to less than 5.5 and for one year it reached its target of 5.

The science needs and resources are managed by setting priority lakes and projects. As lake restoration has been successful, attention is moved to the next set of lakes.

## 2. Science Plan Objective

The objectives of the science plan are:

- 💧 To provide science directions for monitoring, research, and advice for the Rotorua Te Arawa Lakes Programme for the next 12 months to 5 years;
- 💧 To provide an opportunity for team members to identify science gaps within the Programme and help set the science direction for the plan; and
- 💧 To provide a transparent and visible science plan for the RTALP partners and public, so that science direction and priorities are understood
- 💧 To provide science that is a foundation for clear Lake restoration and protective action, monitor the progress and identify where action and science needs to adapt in response to the results observed.

It should be recognised that although a formal science plan had not been written previously, science direction has been managed by the WQTAG and relationship with the University of Waikato (UoW). This has provided a good foundation for the restoration work that has already taken place.

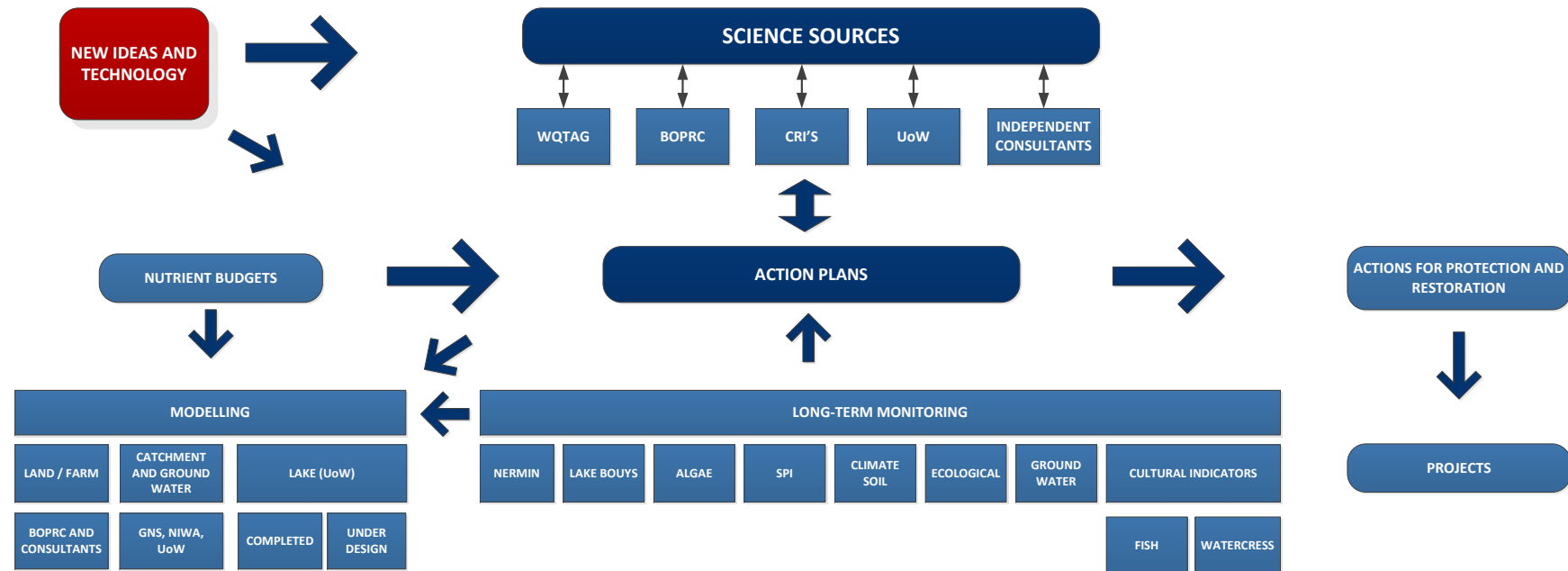
### 3. Science Structure

Science input is a vital component of the RTALP. It impacts by providing monitoring information and providing advice on potential impacts: including lake and catchment modelling. This advice in turn, helps inform the lakes management of potential solutions and risks and inform planning of lake and catchment parameters pertinent to development of policies, Rules and Incentives.

Initially, the Programme focused on interventions that would provide rapid improvement in water quality. In some cases, these have been short-term interventions such as the Ōhau Diversion Wall, alum dosing, and weed harvesting. Some longer-term interventions have also been applied, such as sewage reticulation and treatment. It has always been intended to implement long-term sustainable interventions, such as matching catchment land use with sustainable lake loads. Science advice is needed to support these decisions. The restoration effort has generally focused on undertaking actions on the poorer water quality, leaving the protection work on the better lakes until later. Consequently, as each lake improves, the focus of actions is transitioning from generally short-term interventions to longer-term interventions, such as catchment land use. As a result, there is an increasing demand for land-use science advice for planning decisions as well as for identification of restoration actions. This change in focus is reflected in the science plan, but it must be recognised that the water / lake science underpinning the Programme will not be weakened because of an additional element of the science focus.

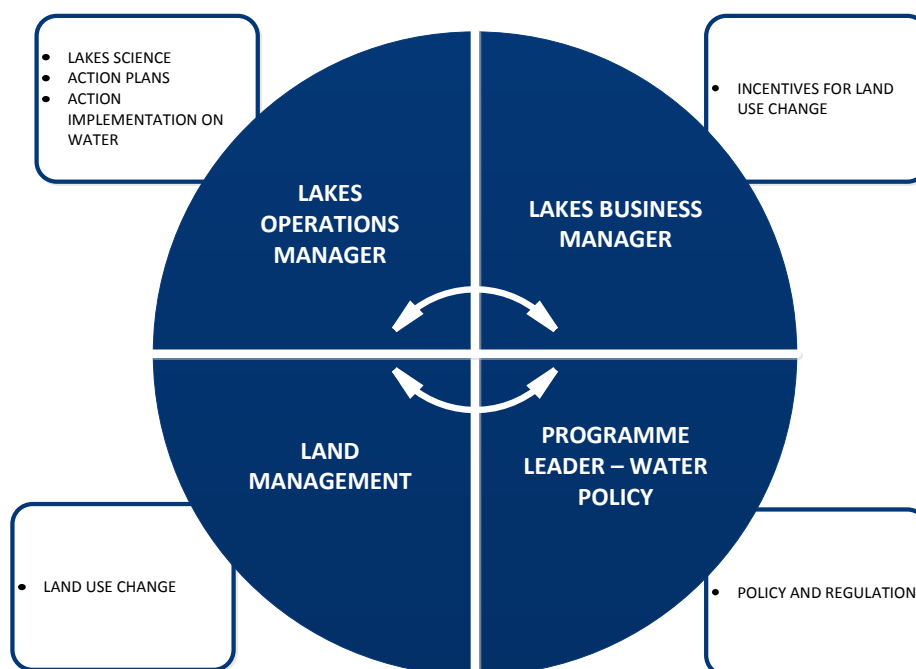
The structure of the Science Programme is not particularly complicated, but it does have a number of elements working together at any one time that makes precise definition more difficult. In addition, due to the new and innovative approach of the Programme the structure needs flexibility and agility to allow science innovation and application down new paths as they emerge. The Science Programme for the lakes is the responsibility of the Lakes Operations Manager.

Diagram 1 – Programme Science Structure



The Programme Science Structure Diagram is centred on the Action Plans (Diagram 1 – Programme Science Structure). This is a clear signal that the science effort is aimed at actions designed to restore lakes. This is in stark contrast to many local authorities where the focus is typically on monitoring and documenting the state of local waters (decline) and less effort focused on restoration.



**Diagram 2 – Workstream Leads and the Relationship with Science**

Generally lake research opportunities and interventions for in-stream and in-lake restoration are initiated by our science advisors. They provide comment commonly through the TAG's. This is then communicated to the RTALP via the action plan process where the science advisors advise the community and Rotorua Te Arawa Lakes Strategy Group (RTALSG) about the benefits and disadvantages about a specific intervention or research opportunity. These can then be included in actions in the action plan process and implemented through that process.

The agreement with the UoW enables high level thinking on potential projects and the outcomes to date have been spectacular (Gaps in Water Science). It is recognised that:

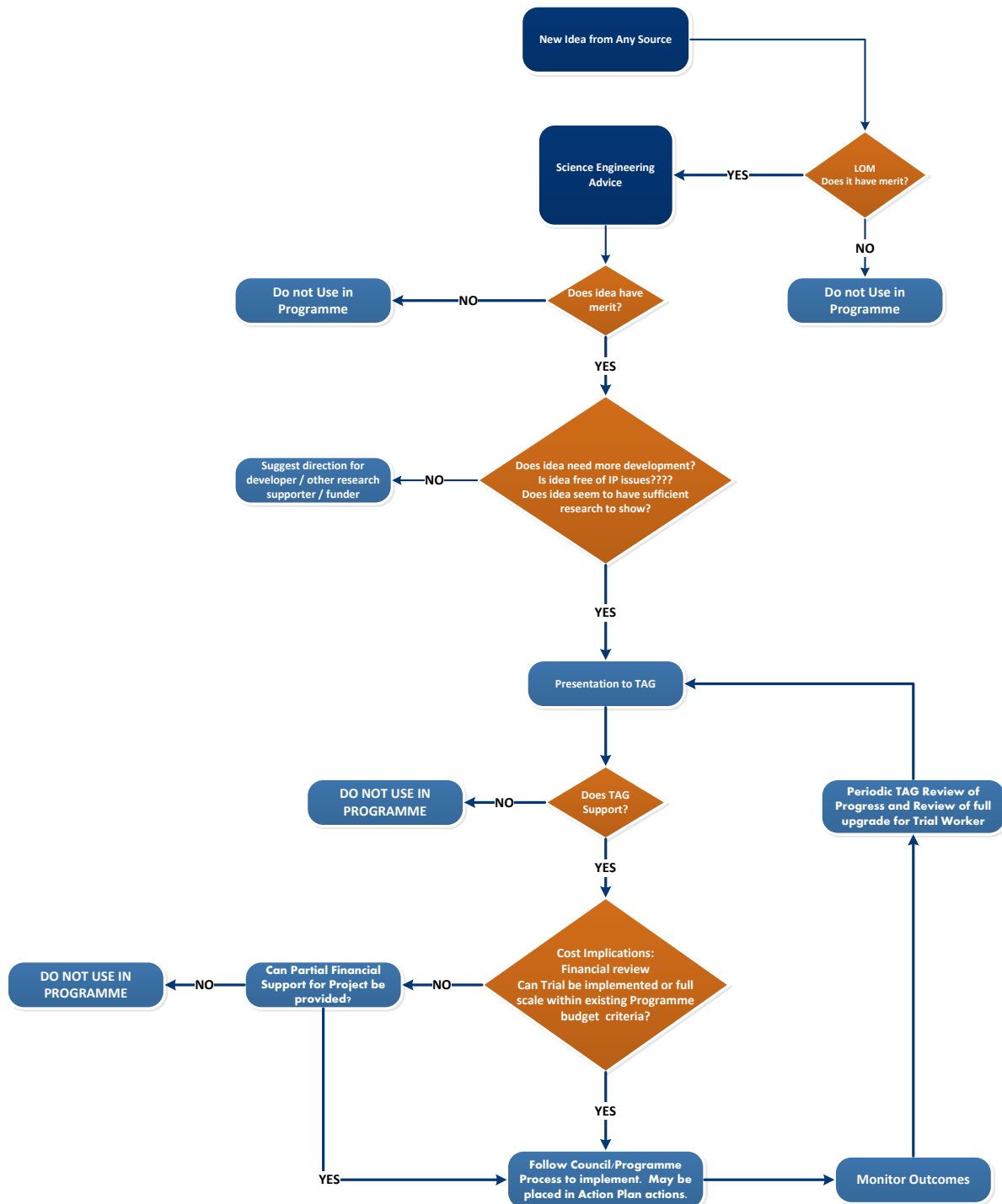
1. Lake hydrology and ecological models will be progressively set up for each lake
2. Lake nutrient budgets will be prepared as required for each action plan or review process
3. Monitoring and research with accompany lake intervention and the outcomes will be discussed at regular TAG meetings
4. New ideas for research, monitoring, restoration will be brought to the TAG for discussion and a decision will be made as to any further action.<sup>1</sup>
5. The Lakes Operations Manager and the Lakes Chair meet regularly to agree on short-term priorities to achieve the outcomes listed above.

<sup>1</sup> Preliminary screening of new ideas precedes any info presented to WQTAG to avoid inappropriate info being presented.

## 4. New Ideas and Innovation

Frequently, external sources are requesting opportunity to present new ideas and innovations of lake restoration prototypes. The BOPRC is pleased to receive ideas and innovations; however, these presentations are not always supported by science research suitable to demonstrate applicability to the Programme. To allow new ideas to progress into our Programme, while avoiding resources being wasted, all submitted ideas follow the process set out in the flowchart below (Diagram 3 – New Ideas and Innovation Flowchart) to assess the ideas viability for the Programme.

Diagram 3 – New Ideas and Innovation Flowchart



Note: The process for initiation action to undertake new science work is detailed below. The areas identified are:

1. New technical ideas that may have anecdotal evidence of success,
2. New technical ideas that has research results to support, or
3. New technical ideas that has been applied in other environments, but not in the Programme.

The Lake Operations Manager undertakes a preliminary review of new ideas, often with advice from one or more scientists. Frequently, external people are looking for research support and funding to prove their ideas. These types of projects typically would not be discussed at TAG. It is likely the applicants would be referred to alternative national funding sources.

## 5. Science Groups within Programme

GROUP	Function	Frequency	BOPRC / Facilitator	
WQTAG	Provide science advice and critique for the RTALP. Terms of Reference (ToR) Stakeholder Advisory Group (StAG)	3 - 4 times annually	Lakes Manager	Operations
UoW	To encourage research around the Rotorua lakes	Monthly and as required	Lakes Manager	Operations
APTAG				
STAG	To advise on sediment research and remediation. Reports to WQTAG. Appendix 1 – Terms of Reference (ToR) WQTAG	3 - 4 times annually As requested	Professor Hamilton	David

## 6. Science Providers

ORGANISATON OR GROUP	AREA OF EXPERTISE	RELATIONSHIPS	CURRENT PROJECTS
UoW	<ul style="list-style-type: none"> <li>💧 Water Quality</li> <li>💧 Monitoring</li> <li>💧 New techniques</li> <li>💧 Research</li> <li>💧 Lake restoration prototype</li> <li>💧 Modelling for lakes</li> <li>💧 Ecology</li> </ul>	<ul style="list-style-type: none"> <li>💧 Contract Chair</li> <li>💧 Post Doc</li> <li>💧 Technical Support</li> <li>💧 PhD and Masters projects</li> <li>💧 Other providers e.g. Nick Ling and Brendan Hicks</li> </ul>	<ul style="list-style-type: none"> <li>💧</li> </ul>
NIWA	<ul style="list-style-type: none"> <li>💧 Sediment</li> <li>💧 Water Quality</li> <li>💧 Catchment land use</li> <li>💧 Ecology</li> <li>💧 Project monitoring</li> </ul>	<ul style="list-style-type: none"> <li>💧 TAG contract</li> <li>💧 Max Gibbs</li> </ul>	<ul style="list-style-type: none"> <li>💧</li> </ul>
GNS	<ul style="list-style-type: none"> <li>💧 Groundwater</li> <li>💧 Monitoring</li> <li>💧 Modelling</li> </ul>	<ul style="list-style-type: none"> <li>💧 Paul White</li> </ul>	<ul style="list-style-type: none"> <li>💧 Tarawera Model</li> </ul>

## 7. Research Funding Support

Through the process of assessment, the BOPRC needs to determine its involvement and local funding. Ultimately, this is reliant on agreement from the RTALSG and subject to some general guidelines:

1. The restoration or research process is transparent and the BOPRC will have access to the technology without an unreasonable additional cost (e.g. royalties or fees for IP etc.)
2. There is sufficient evidence to suggest the project is technically feasible and likely to have the environmental outcomes that are claimed and in sync with the Programme objectives.
3. That WQTAG supports the project.
4. The level of funding support and BOPRC involvement in the project will depend on the potential benefit to the RTALP and the perceived responsibility within the project area. Typically, in-lake and in-stream interventions will be led by BOPRC, as the council has clear RMA responsibilities in that field of the environment. Conversely, land catchment interventions are more likely to be led by other organisations or individuals. However, BOPRC may be a collaborator including part-funder.
5. Where BOPRC is a collaborator or part-funder, without direct control of the project; a clear business case for support must be provided before any funding decision will be made.
6. Generally two (2) types of projects will be considered:
  - a) New science / technical ideas (not applied elsewhere)
  - b) Existing science / technical applications that have worked elsewhere but need to be tested within the Programme and the local Rotorua environment.
7. Each project will be assessed against general Iwi and community expectations and aspirations. If long-term application is likely to be impeded by Iwi and community aspirations, then funding may not be appropriate.

## 8. Current Science Plan

The current Science Plan is a well-structured Programme of research, monitoring, and interventions that have delivered lakes restoration outcomes over the past 13 years. Some specific case studies are attached in [Appendix X](#) to demonstrate how these have worked.

An important observation from the science monitoring and implementation Programme over the past 13 years is that some new ideas have had spectacular outcomes; some have been lake specific only and implementation has enabled identification of issues that can make particular projects succeed or fail. In addition, in deciding upon science projects, simple analyses such as “lowest cost” are not appropriate, as many interventions have been implemented due to community and cultural preference. In addition, caution needs to be exercised in comparison of actual monitoring results, with modelled results as the modelling process may not properly demonstrate the real environmental outcomes from implementation (e.g. weed harvest example).

## 9. Current Workstreams

1. Provide science on state of each lake:
  - a) Maintain a monitoring Programme for N&P, Secchi disc and chlorophyll-a
  - b) Feed out TLI changes annually in July of each year
2. Support Action Plans:
  - a) Provide information on in-lake and in-stream interventions
  - b) Monitor specific projects - all action plan projects
3. Support management and planning of the RTALP:
  - a) Support science to implement action plans e.g. nutrient budgets, groundwater models / monitor etc.
  - b) Modelling of land use and lakes:
    - i) On farm
    - ii) Catchment
    - iii) Lake models progressively onto each lake
    - iv) Provide more specific lake modelling integration for Lake Rotorua
    - v) Support the testing of projects for deed funding or other funding e.g. Aeration for deed funding
4. Support ecological monitoring and restoration projects:
  - a) Koaro
  - b) Kakahi (Rotokakahi)
  - c) Kakahi and koura (Ōhau Diversion Wall)
  - d) Trout fishing and associated smelt and migration issues – Ōhau Diversion Wall
  - e) Floating wetlands (all lakes)
5. Provide other lake science as needed:
  - a) Ōhau Diversion Wall - impact of adjusting Okere control gate flows
  - b) Ōhau Diversion Wall - impact of removal if Lake Rotorua reaches TLI 4.2 and associated risks
6. Land use science:
  - a) Identify opportunities for nutrient footprint reduction e.g. P-Project and engagement opportunities e.g. gorse
  - b) Identify opportunities for collaboration and possible joint funding



## 10. Key Issues

The following is an identification of potential key science issues that could pose significant risk to the RTALP if the prior work streams are not maintained :








1. Specific science monitoring and assessment of alum use on lakes. Alum dosing has now become a key part of the Lakes Programme, with two (2) Alum dosing plants on Lake Rotorua streams, Puarenga and Utuhina; one (1) dosing plant on Lake Rotoehu stream and on-going alum dosing directly into Lake Ōkaro. Monitoring involves the following:
  - a) Plant management and dose rate
  - b) Water quality monitoring, specifically Al and P
  - c) In-stream and in-lake ecological monitoring annually
  - d) Lake sediment monitoring – every three (3) years
  - e) Targeted ecological monitoring as necessary, previously undertaken by NIWA

Alum dosing has proven to be a successful strategy in the restoration of Lake Rotorua. Until land use changes come into effect and a reduction in nutrient inputs is achieved (reaching the lake), then alum dosing is likely to be necessary. A major risk is that any reduction in monitoring here could reduce the ability to assess the environmental safety of alum dosing.

2. Many of the lakes projects are subject to RMA and resource consents. Science monitoring is necessary to ensure legal compliance with resource consent conditions. Performance and environmental monitoring is also necessary to support the resource consent application process in the future, as consents expire and need to be replaced.

This applies to the alum dosing plants as described above, but is also critical for projects such as the Ōhau Diversion Wall.

The Ōhau Diversion Wall consent expires in October 2017. It is anticipated that a resource consent replacement will be required. Monitoring of the wall includes:

-  Water quality
-  Water flows and velocity
-  Native and introduced fish species
-  Avifauna
-  Structure integrity
-  Sediment movement and disposition
-  Modelling of hydrodynamic and ecological impacts

3. There is significant value in long-term continuous monitoring records, for determining lake water quality trends and changes. In the past, where monitoring records have been stopped due to lack of resources or redirection of resources, this has made understanding water quality changes more challenging. Prior to ceasing any long-term monitoring, an assessment of the long-term needs and potential risks requires to be undertaken by appropriate science advisors.

4. The Programme will be active in identifying new monitoring techniques that can improve supplying analysis and monitoring outcomes. Some examples of this type of innovation are: hi-frequency monitoring buoys, satellite images and DNA sequencing for identification of algae species. In these types of applications, there can be multiple advantages and potential to lower costs. For example, recent development of the pH monitoring buoy in Lake Ōkaro is now able to identify suitable and not suitable times for alum dosing applications.

## 11. Programme Gaps

A workshop was held in November 2013 to identify science gaps within the current Programme. Two (2) specific areas were identified:

1. Current general water science
2. Land use science

The workshop attendees were selected to provide scientists and end users (Programme Workstream Leads), help to identify Programme science gaps (Appendix 3 – Science Workshop Attendees).

## 12. General Water Science Gaps

1. Groundwater for Rotoiti, Rotoehu, Rotorua lakes
2. Cultural indicators / mahinga kai
3. End user needs
4. Other water quality indices (not just TLI and perhaps monthly TLI)
5. Mechanisms to get ideas into science Programme
6. Mechanisms for action plan change / review
7. In-lake contaminants / risks
8. Science succession for Programme
9. Loss of native flora / floating wetlands
10. Regular science forum, extension of student presentation
11. Backwards modelling of scenarios
12. In-flows, quality of data
13. Story of TLI to communities and proxies
14. Local and Māori student involvement
15. Storage of information - access to public and scientists

## 13. Land Use Science Gaps

1. Focus on sources
2. Best Management practice applied
3. Social science - change habits
4. Focus on reduction of sources
  - a) Knowledge
  - b) Research
5. Farm scale modelling - validation
  - a) Other types of farming
6. No soil science expert employed by council

## 14. Addressing the Gaps

Addressing the gaps s broken into the two component parts:

### 14.1 Gaps in Water Science

Definition of Gap	Who to consult	Potential Solution	Resource Need Minor / Major
GW for Rotoiti, Rotoehu, and Rotorua lakes	GNS and WQTAG	Monitoring bores and model development	HIGH
Cultural indicators -mahinga kai			
End user needs			
Other water quality indices (not just TLI and perhaps monthly TLI)			
Mechanisms to get ideas into Science Programme			
Mechanisms for action plan change / review			
In-lake contaminants / risks			
Science succession for Programme			
Loss of native flora / floating wetlands			
Regular science forum, extension of student presentation			
Backwards modelling of scenarios			
In-flows, quality of data			
Story of TLI to communities and proxies			
Local and Maori student involvement			
Storage of Information-access to public and scientists			

## 14.2 Gaps in Current Land Use

Although there is a need for additional land use advice from science, the extent of the Programme partners in providing that advice is not clear. In addition, the science Programme currently has inputs to land use science in the following areas:

1. Connection of catchment land use and lake models for specific lakes. In particular, the subject of a range of scenarios for Lake Rotorua.
2. Some specific land use interventions have been researched and led by BOPRC. This includes gorse N leaching and P-detention bunds.
3. Focused reports have been commissioned on land use impacts of farming and also on mitigation measures and their effectiveness
4. BOPRC is a co-funder of a number of land use research projects in the region, including the Parakarangi SFF Project

The question has been raised whether a specific land TAG should be convened, similar to the WQTAG. It appears there is some expectation of this, from comments from the Stakeholder Advisory Group (StAG). It would appear BOPRC's mandate or responsibility to fund such a group is not clear together with the land use questions being considered as science or technical questions requiring specialist technical advice? If a second TAG which is focused on land use was to be formed, then there would be a need to have an integrated connection with the WQTAG as much of the long-term work to improve water quality in the Lakes is reliant on long-term land use change.

An alternative approach would be to expand the Terms of Reference (ToR) and functions of the WQTAG to encompass the areas of land use to provide the necessary advice on land use science. Some distinct advantages can be leveraged from this approach:

- 💧 One all-encompassing Advisory TAG
- 💧 Much of the current UoW modelling work relates to land use change scenarios, and so additional brain power there will provide more robust results
- 💧 Identifying the full range of mitigating land use practices and options is beyond the scope of the Programme partners, so BOPRC should be careful to avoid being too influential in the options chosen, but focus on providing an environment that encourages the industry to identify options. The TAG could then provide advice, where necessary, to confirm the science around the option(s) identified and highlight any information gaps.
- 💧 The mass balance model used in the action plans can be maintained and refined for each lake on a continuing basis; as it is a transparent method and a useful policy tool depending on how catchment policies may be framed in the future.

## 14.3 Proposal

The decision to form a Land Use Technical Advisory Group requires further specific assessment and consideration. This will be managed over the next six months via a separate process.

## 15. Appendix 1 – Terms of Reference (ToR) WQTAG

### Draft Terms of Reference: Lakes Technical Advisory Group (21 May 2012)

#### 1. Purpose of the Lakes TAG

To provide technical advice on lake science and management to BOPRC, RDC and TALT in order to improve the water quality of the 12 Te Arawa Rotorua lakes. The purpose of the Lakes TAG is to operate as an informal forum of experts on lake water quality problems, causes and solutions.

#### 2. Membership

The membership comprises representatives from the following core organisations: BOPRC, RDC, TALT, NIWA, UoW, GNS and SCION. Lakes TAG membership can be fluid, reflecting changes to priority issues, the evolving research and operational programmes, staff roles and availability. At the discretion of the Lakes TAG convenor, additional people can be invited to participate on a short or long term basis.

#### 3. Scope of work

The Lakes TAG will make considerations of, provide coordination and guidance to, and make recommendations on, the following matters relating to **the water quality of the 12 Te Arawa Rotorua lakes**:

- a) Lake, aquifer, catchment and ecological research linked to lake water quality status, trends and potential water quality solutions, including:
  - i) Current and future lake nutrient loads and water quality response
  - ii) Sediment nutrient release and management options, taking into account advice from the Sediment TAG
  - iii) Nutrient load reductions necessary to achieve the water quality targets and other matters relating to water quality as identified in statutory planning documents
  - iv) Current and future risks to lake water quality, including climate and land use risks,
  - v) Hydrology (surface and groundwater) and land use.
- b) Operational matters, including current and proposed in-lake and in-stream mitigation actions
- c) Monitoring regimes, results and analysis
- d) Input to the development and review of non-statutory documents, including lake Action Plans.

The Lake TAG is not expected to provide technical guidance on practical aspects of land use and land management change except as they impact on overall lake nutrient loads. The Lakes TAG can identify land use knowledge gaps that may be an impediment to progress on achieving water quality targets.

#### 4. Meetings, Reporting, Confidentiality and Financial Support

- a) The Lakes TAG will meet 2 to 3 times per year and operate by consensus.
- b) The Lakes TAG convenor is BOPRC's Lake Operations Manager, Andy Bruere, who is responsible for circulating agendas and minutes to all TAG members.
- c) Formal reporting of Lakes TAG advice is via the convenor of the Rotorua Te Arawa Lakes Strategy Group, and Regional Council, Rotorua District Council and Te Arawa Lakes Trust by their representatives as appropriate. Minutes of the TAG meeting are public documents. Some aspects of items raised at the TAG meeting in confidence, to aid free and frank discussion, may be excluded from the minutes by agreement at the time of the meeting.



- d) The Lakes TAG does not have authority to initiate projects or incur costs beyond meeting-related costs, with such projects subject to the external approval processes of BOPRC, RDC and other agencies.

## 16. Terms of Reference (ToR) Stakeholder Advisory Group (StAG)

### Draft Terms of Reference for the Sediment Technical Advisory Group (STAG)

#### *A sub-group of the Rotorua Lakes Water Quality Technical Advisory Group (WQTAG)*

Draft ToR version dated 29 October 2010

#### **1. Purpose of the STAG:**

To provide scientific advice and operational direction on how to reduce internal lake nutrient loads via lake-bed sediment management techniques.

#### **2. STAG Membership:**

- 💧 Prof David Hamilton (Convenor)
- 💧 John McIntosh
- 💧 Max Gibbs
- 💧 Andy Bruere

Plus co-opted experts as required, including specific postgraduate students and staff from the University of Waikato, NIWA and SCION scientists, and private sector experts with relevant expertise, products and systems.





#### **3. Scope of STAG's work**

- a) Provide advice on all relevant remediation methods, and potential for ecological and human health effects, of lake bed sediment flux measurement, including, but not limited to:
  - 💧 Sediment capping materials
  - 💧 Hypolimnetic dosing materials, e.g. with alum
  - 💧 Oxygenation and de-stratification
  - 💧 Dredging
- b) Formulate criteria for recommending research into any particular product or technique.
- c) Review sediment treatment proposals and trials brought to WQTAG and BOPRC and make recommendations.
- d) Provide input to other related Rotorua lakes research initiatives, including the in-lake modelling of sediment nutrient dynamics and the response of lakes to interventions and climate change effects.
- e) The STAG does not have authority to initiate projects or incur costs beyond meeting-related costs. As such projects/costs will need to go through the normal project approval processes of BOPRC and other agencies. The STAG can, however, recommend projects for approval to BOPRC or make recommendations through the WQTAG (see below).

#### **4. Meetings, Reporting and Support**

- a) Aim to meet 2 to 3 times per year and to operate by consensus.
- b) Report to WQTAG as part of WQTAG regular meetings.
- c) Financial support will be provided by BOPRC for the actual and reasonable meeting costs of STAG members.
- d) Meeting agendas and minutes will be documented and circulated to all STAG members.

## 17. Appendix 3 – Science Workshop Attendees

<b>BOPRC</b>	<ul style="list-style-type: none"> <li> Andy Bruere</li> <li> Gloria Zamora</li> <li> Anna Grayling</li> <li> Alastair MacCormick</li> <li> Rob Donald</li> <li> Paul Scholes</li> <li> Alastair Suren</li> <li> Sarah Omundsen</li> <li> Ian Morton</li> <li> John Paterson</li> <li> Niroy Simeran</li> <li> John McIntosh</li> </ul>
<b>RDC</b>	<ul style="list-style-type: none"> <li> Alison Lowe</li> </ul>
<b>TALT</b>	<ul style="list-style-type: none"> <li> Hera Smith</li> </ul>
<b>UoW</b>	<ul style="list-style-type: none"> <li> Prof David Hamilton</li> </ul>