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58th LAKES WATER QUALITY SOCIETY ANNUAL REPORT 2019

It is my pleasure to present my fourth annual report.

Biosecurity and the lack of it has been our principal focus this year. There was failure to attract strong public support for our *Stop the Trouble Makers* workshop on catfish. This and concerns raised by government agencies on our proposed clean boat self certification rule led us to elevate the discussion to a symposium in November.

Symposium – Float your Boat Certify

The symposium was themed around biosecurity, the Tarawera Lakes Complex and Lake Rotoehu. We brought Dr Lars Anderson from California and he was able to highlight how Lake Tahoe had successfully prevented further pest incursions. When invasive species were 600 kilometres away from Lake Tahoe, there was concern that these species were within one day's drive and the threat was imminent. A "belts and braces" approach was taken with the issuing of tokens to prove that boats had been cleaned before launch. In a video link we were able to see their programme working, no incursions have occurred in the last decade.

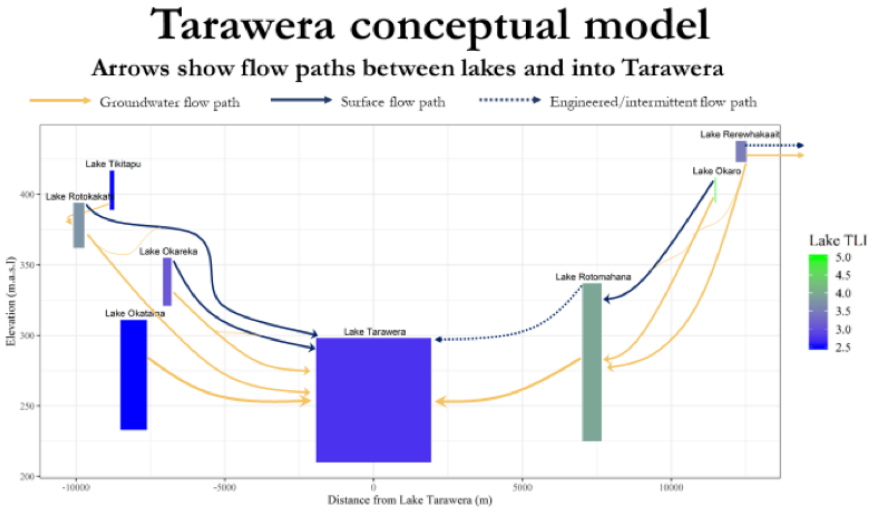
Pest Plan action

It is recognised that Bay of Plenty Regional Council are required to complete the Pest Plan, we would anticipate the inclusion of the appropriate rules we have advocated for. Additionally, the Biosecurity Act will need to be amended to allow the issuing of infringement notices and instant fines. This is timely as it corresponds with a major review of the act and hopefully this will be done in 2020. Council have commenced an education programme around *"check, clean, drain and dry*", the addition of "*drain*" applies to boats. This will be done through a re-focused summer programme supported by a paper based self certification system.

BOPRC fully supported our proposal.
The overall support for this major initiative was compelling and drew support from all levels. We expect a self certification system to be fully implemented by 2021.

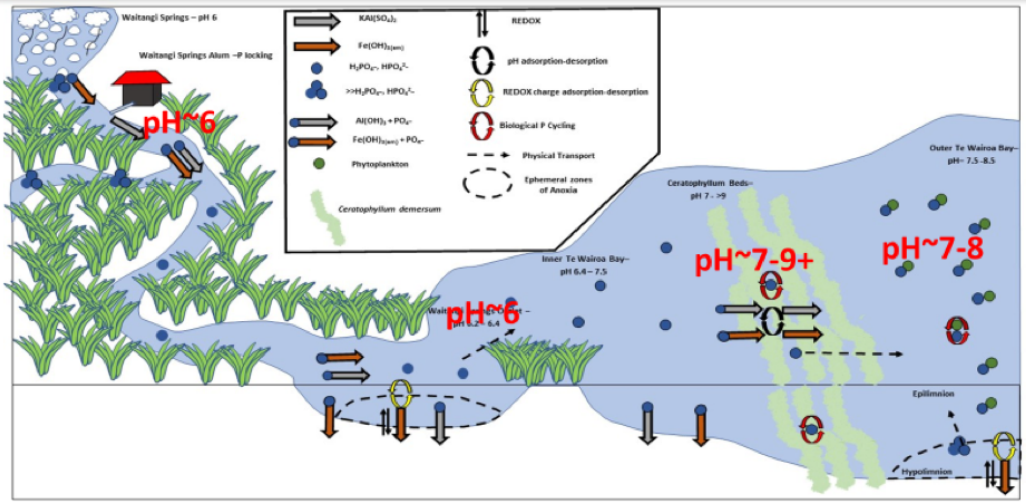
8 Lake Tarawera Complex

Focus was given to the 8 Lake Tarawera Complex. Chris McBride provided a model of the nutrient flows within the catchment and this is shown below. Work is still required around the geo thermal inputs and tracing of the different forms of phosphorus will enable a more complete understanding.



More information on hydrological connections: White et al. 2016 (GNS report)

The complex chemistry of Lake Rotoehu was well illustrated by Chris Eager from University of Waikato. Andy Bruere (BOPRC) advised of the probable relocation of the alum dosing plant to avoid the problems identified by Chris Eager.

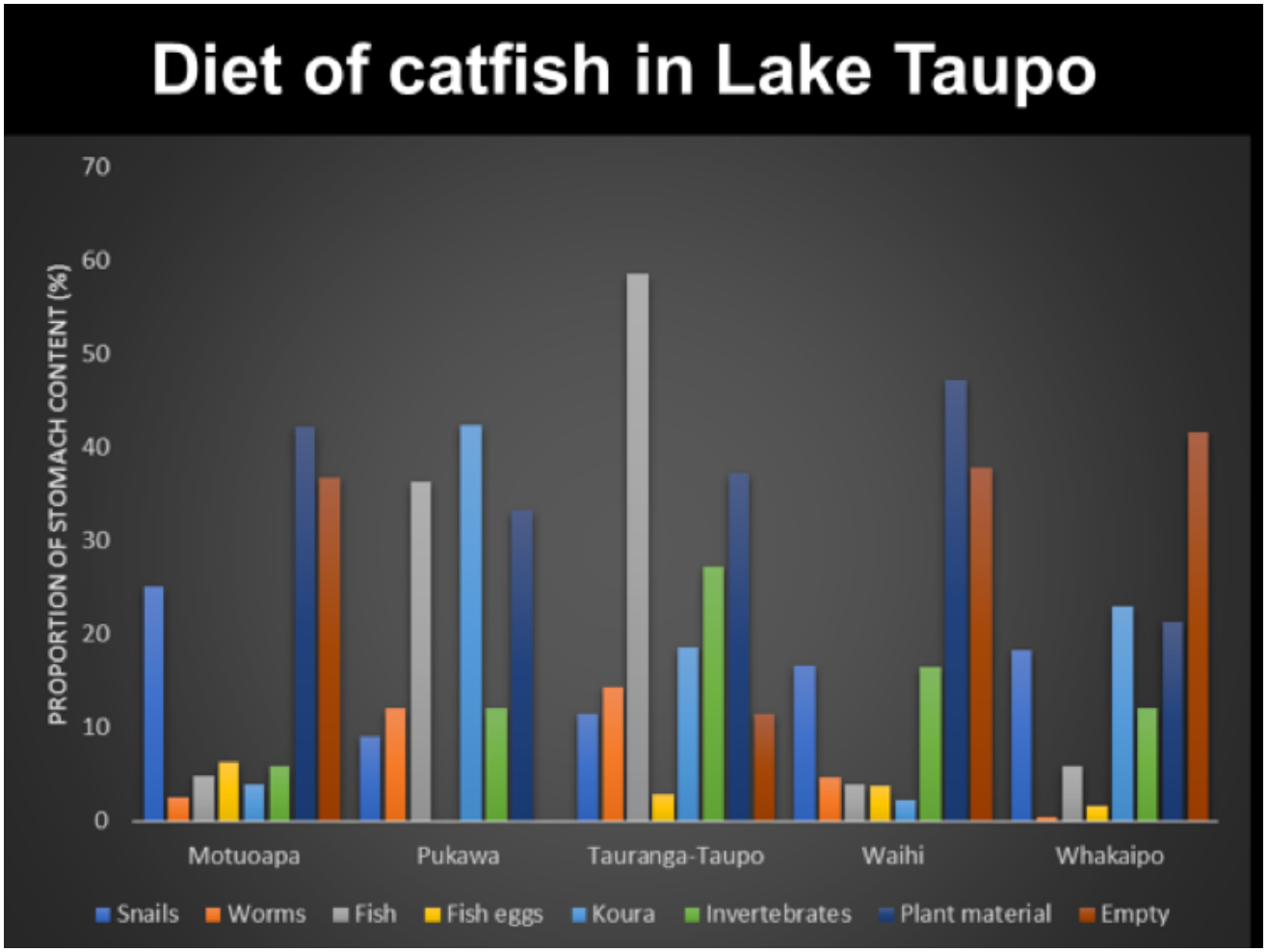


Ian McLean provided a summation and action wrap up and his **full paper is attached**.

Catfish

Over 66,000 catfish have now been caught in Lake Rotoiti, an additional 170 have been caught in Lake Rotorua. While total numbers for the current year have diminished and this is pleasing given double the number of nets were set, at best we can say that the problem is being successfully managed. It is hopeful that numbers will again diminish this year.

It is an interesting conjecture that aged catfish have been caught in Lake Rotorua and there is a proposition that brown trout are helping in their control. There should be an opportunity to do a study of this through brown trout stomach analysis. In a symposium paper presented by Michel Dedual, there is evidence that brown trout predate on juvenile catfish occupying the same littoral zone. Looking at Catfish diet, koura make up a substantial portion of it in some locations.



Endothall

support to $240,000 for weed control on the lakes. The consent does limit the spraying of embayments such as Okawa, Te Weta and Otaramarae to 5% of their total area unless an eradication programme is being undertaken. This will prevent adequate management of the weeds until there is an eradication programme.
An amendment to the consent will be required unless eradication can be undertaken within a year.

State of the Lakes

The following information is provided from the Annual Report on the Rotorua Te Arawa Lakes Programme.

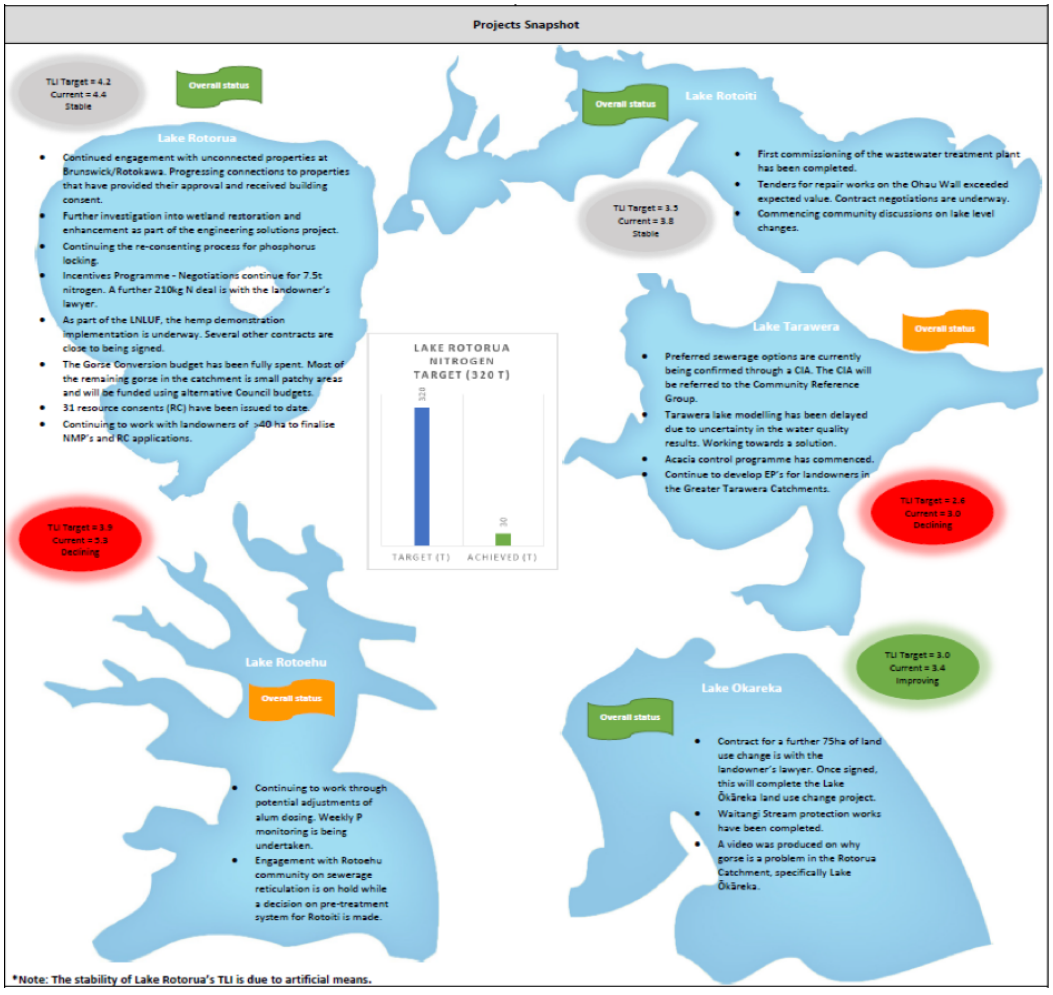


Table 1 Three-yearly average TLI values, annual TLI, trophic status category and LakeSPI condition for the Rotorua Lakes.

Lake *Regional Natural Resources Plan Objective TLI units*	2014/15 Annual TLI *TLI units*	2015/16 Annual TLI *TLI units*	2016/17 Annual TLI *TLI units*	2017/18 Annual TLI *TLI units*	**2018/19 Annual TLI**	**2018/19 3 yearly annual average TLI**	**Lake Type** *based on Trophic Status*	**LakeSPI Condition** 2018[1]
Ōkaro **5.0**	**4.6**	**4.6**	**4.9**	5.2	5.2	5.1	Super-trophic	Moderate
Rotorua **4.2**	4.4	4.4	**4.1**	4.3	4.4	**4.2**	Eutrophic	Moderate
Rotoehu **3.9**	4.5	4.6	4.6	4.8	5.3	4.9	Eutrophic/ Super-trophic	Poor
Rotomahana **3.9**	4.0	4.0	4.0	4.2	4.0	4.1	Mesotrophic/ Eutrophic	High

Monitoring of the of the 12 Rotorua lakes shows that:

- Lake Ōkaro remained above its target TLI for the second year, due to increased TP and TN.
- The TLI for Lake Rotorua remains just above its RNRP objective; however, cyanobacteria activity remained at a low level.
- Lake Rotoehu experienced prolonged and severe cyanobacteria blooms exacerbated by sustained stratification. Its annual average TLI moved into super-trophic classification (TLI of 5.3), the first time since the early 1990s.
- Lake Rotoiti TLI remains stable, but still exceeds its target TLI by 0.3 TLI units. Okawa Bay did, however, experience cyanobacteria bloom in late autumn resulting in a health warning. The lake has remained resilient to further degradation since the installation of the Ohau Channel diversion wall, as indicated by stable hypolimnetic oxygen concentrations and dissolved nutrients.
- After the multiple rain events of the previous year resulted in increased phosphorus levels and rising lake levels, Lake Ōkāreka's annual average TLI decreased compared to last year's (three year annual average remained the same). Nitrogen remains stable but there is an increasing phosphorus trend.
- Lake Rerewhakaaitu's annual average TLI has risen over the past two years, driven by sustained stratification events due to climatic conditions.

LWQS say

Lake Rotorua

Proposed Plan Change 10 has been reported back in an interim decision from the Environment Court, some details are still being sought but the decision substantially confirms the initial application. LWQS urge objectors to accept the Court findings.
The Incentive Board has been disbanded and brought back inhouse after only achieving 22.5 tonnes of their targeted 100 tonnes of nitrogen. The achievement is disappointing and substantially behind expectations. In accepting the scheme of arrangement, BOPRC and Government committed to the task and risk of achieving the 100 tonnes. They cannot expect farmers to do the hard yards and not do them themselves. This programme has been underfunded and further financial contributions are likely to be required.
214 hectares of gorse has been removed from the catchment and this represents all the major gorse blocks.
The Tikitere phosphorus extraction plant has been cancelled because of cost and an alternative proposal is required to remove the expected 30 tonne of N.

Lake Rotoiti

Work to repair the diversion wall is expected to be undertaken in 2020. A decision is still awaited on the preferred sewerage scheme for Eastern Rotoiti.

Lake Rotoehu

The consent for alum dosing has been lodged and will be out for public consultation in the New Year. Given the likelihood of algae bloom until alum dosing is commenced, there is urgency to get this process done quickly. We encourage Iwi and locals to push

Lake Rotoma
It is pleasing that the sewerage scheme is complete and operational.

Lake Tarawera
At the symposium, Minister David Parker suggested that funding for wallaby control could be accessed through the Provincial Growth Fund. Guy Salmon endorsed this. We are urging BOPRC to follow this up.

Lake Okareka
The TLI still continues to track above expectations but the recent Land Use changes should enable the full restoration of this lake. Hornwort has been successfully controlled and this is a pleasing outcome.

Lake Okaro
This lake is above its TLI and currently experiencing a bloom. The farmers in the linking catchments have been pro active with nutrient management and it is hopeful that an improvement is on the horizon.

Lake Okataina
This is our quiet lake and like Tarawera is significantly above its targeted TLI. There is little outside influence other than erosion from wallaby grazing the understorey.

General

I have been involved in the Society for the last 17 years, 10 years as Deputy Chair and the last 4 as Chair. I will not be seeking re-election as Chairman but will offer myself as a committee member. Dianne and I are proposing to travel and spend more time in Auckland in the next year and the Society needs a residing Chairman. I acknowledge the substantial amount of work Dianne has done in the background and thank her for those efforts.

I would like to take an opportunity to reflect on many of the achievements the Society has seen in the last two decades.

The scene was set in 2001 with Prof Willy Ripple from Germany advising that we had to take a catchment approach to any restoration of the lakes. Following that symposium, Regional Council appointed Professor David Hamilton as Lakes Chair at Waikato University and this was the recommencement of a science led approach to restoration. In those initial years, there was significant confrontation with Council and farming groups over timing and urgency. The society role has been to identify issues, encourage scientific research, through symposia and advocacy allow informed political and public debate, encourage funding and encourage the implementation of restoration programmes. To this end we have now had 11 symposia. Major achievements have been the Ohau Channel Diversion Wall, assisting in the obtaining of $74m Government funding which was doubled by Council contribution, and the reticulation of sewerage around most of our lakes, this is still work in progress.
Three foundation agreements charting the way forward were committed to:
2011 The Waiora Agreement was signed with Federated Farmers and LWQS agreeing to cooperate. 2013 the Oturoa Agreement was signed with Federated Farmers, BOPRC and LWQS agreeing to participate.
2017 Science Accord was signed by the above parties agreeing that the best science would be adopted.

In the Rotorua Catchment STAG completed recommendations for Rule Change 10 after 3 years of work and this is now in the final stages in the Environment Court. Since then we have turned our focus to biosecurity which was sadly lacking. Endothall is now a consented herbicide and in process of trials. Aquatic Weed Plans have been prepared for all lakes and are due for adoption by Council. These plans provide the blueprint for the restoration of the aquatic flora and the eradication of pest weeds. Substantial additional funding has been committed from LINZ and agreement to fund the plans has been given. The tragedy of the catfish incursion has been confronted and we have substantially completed the resetting of biosecurity for the lakes.

Acknowledgements

Warren Webber as my Deputy Chair is retiring at the AGM and now resides in Blenheim. Warren has been involved with the Society since the first symposium in 2001 and has been a tireless worker. We have recognised his work and some time ago granted him Life Membership.

Thanks to Phill Thomas who is also standing down and has been an important link with the Community Board.

A special thanks to John Gifford and the effort he put into the symposium.

My thanks to all the rest of the committee for their dedication and work. I have been fortunate in having an excellent committee.

I would like to encourage anybody that wishes to contribute to the committee to make themselves known. We look forward to

Don Atkinson
CHAIR LWQS

ACTIONS AND SYMPOSIUM WRAP-UP
Ian McLean, LWQS
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What great, challenging papers we have heard today. Thank you to all the presenters.

It is splendid to see the progress that has been made in 20 years. I pay tribute to Professor David Hamilton (here today) who revived both lake science in New Zealand and research into the Rotorua Lakes.. More than that, he spent many years building relationships with the community here, both Maori and Pakeha. He stayed nights at the fish hatchery. Many times he did the late night drive home to Hamilton, through fog and frost. He and his students built up the science and relationships that we have today.

Biosecurity and Lakes

During the Symposium Dr Lars Anderson, (US Department of Agriculture), told us that lake science is harder than rocket science.

He described the numerous pests and weeds that the US authorities face - many of which potentially threatened our lakes. In one sense that does not daunt us. In New Zealand we are used to the threat of foot and mouth disease, fruit fly, or Mycoplasma bovis. We live with such threats from abroad.

But what is mind blowing is that aliens are here amongst us. Each lake has its own pests and they differ one from another. These threats are mostly local and from our neighbours in the Waikato.

My view is that for more than 20 years we largely ignored biosecurity for the Rotorua Lakes, and have been playing catch up over the past 5 years.

We were told that each lake needs biosecurity borders. Professor Troy Baisden spoke of changes that need a new approach to science. It requires a huge cultural and disruptive change to think that border security must exist lake by lake. This cultural change is about as big as that which led to the Rotorua City Council ceasing to garbage on the lake edge about 40 years ago so. In order to bring about such a change of culture a massive public education programme is needed.

Clean Boats

The Symposium was titled ‘Float Your Boat, Certify’. The objective was made clear by presenters, and I paraphrase it, ‘All Boats Clean’. Robert Win (Environment Southland) put it as: Clean boats to be the norm.

Several presenters showed that bringing about such a change requires several steps; education, communications, monitoring and enforcement. Nicole Cartwright, (Lake Tahoe Resource Conservation District, USA) said that experience at Lake Tahoe shows that lake biosecurity programmes ‘need to have teeth’. This is because there will be hoons (my word, not hers). Lake-users often meet hoons on the water - people lacking responsibility. The New Zealand surveys reported to the symposium showed that such people are less likely to keep their boats clean.

The LakesWater Quality Society proposal, introduced to the Symposium by Don Atkinson, is very light-touch enforcement. It would take time to introduce. It was pointed out to us that the earlier steps of education, communications, and monitoring can start right now. Some education and monitoring are already being done by the Bay of Plenty Regional Council, but more could be done as preparation for further action.

It was suggested that stickers be provided for owners to put on their boats. Such stickers could show the home lake of the boat and words on the sticker saying, ‘I clean, dry and drain my boat’. Perhaps the sticker might also show also the logos of organisations such as Fish and Game, Te Arawa Lakes Trust, the Councils and LakesWater Quality Society. An expanded education programme with elements such as this could start very quickly and not require any legislation.

Toolbox and technology
I want to congratulate the Regional Council staff, especially Andy Bruere, who are implementing the whole lakes programme, for the great work done over many years.

herbicides.

My question is this:-

- Who each year refreshes the Regional Council's knowledge about of technology available elsewhere in the world?
- Is there an annual snapshot taken and reported to Regional Council?
- Is such information provided to the Regional Council internally, is it done by NIWA, is it done by the University of the Waikato, or is it not done systematically?

If the cleanliness of boats is to be monitored, boats need to be identified - for which there is no legal requirement at present. Lack of registration is not an insuperable barrier to enforcement. While transported on land, boats are on trailers - and every trailer has a registration plate. It would be possible to remotely-sense boats going in and out of the more sensitive lakes and identify them by the trailer plate registration number. What's more, if it is possible to use facial identification on sheep (as has been reported), 'facial recognition' should be possible for boats.

The technology needs to be kept up-to-date: e.g. remote sensing, both under water and from space. This should be reviewed annually and assessed.

Strategy

The Regional Pest Management Plan is primarily a regulatory document, rather than an operational document. There are Lake Management Plans which are operational documents. Hopefully there is also an operational strategic plan which is revised frequently. Such a plan should also be made widely known to the public.
Several speakers emphasised the need for continued monitoring as part of the strategy for weed and pest control.

Legislative constraints

It is clear that current legislation constrains weed and pest management.

For example: the symposium was told that EPA (Environment Protection Authority) requires new chemicals to be proven to be safe by New Zealand field trials before being used. However field trials are not permitted unless the chemicals are first proven to be safe. No chicken, hence no egg – and vice versa.

Many people now consider that planning and consenting under the RMA seem to be devices to make lawyers rich. The process of getting a consent is drawn-out. But it is not consultation with the public that takes so much time: the legal processes cause much of the delay. Lodging a formal objection on one of these consents or plans will initiate letters on expensive lawyers' letterhead for the next 2 or 3 years, every one of which probably costs $100 to write.

Both the Biosecurity Act and the RMA (Resource Management Act) are being reviewed. Better legislation can't come soon enough.

Funding

Hon David Parker stressed the intense competition for public funds. He did suggest the Provincial Growth Fund as a possible source for immediate needs of the Rotorua Lakes. Guy Salmon suggested an application to the Provincial Growth Fund to initiate wallaby control in New Zealand - perhaps $20 million or so to cover more than half the costs. Wallabies are now spreading. There have been rumours of them north of Auckland, and that might not be unhelpful to an application for the Provincial Growth Fund.

Iwi

Concern was expressed that Iwi have not participated in this Symposium as much as is desirable. I pay my respects to Ngāti Tarāwhai whose people spoke to us and to my friends the late Joe Malcolm, and Willy Emery whose health is not good. The challenge is for the LakesWater Quality Society to do more to facilitate engagement with iwi. Maybe a small symposium on a suitable marae would help.

Economics of Biosecurity

Carla Muller, an environmental economist, made it quite clear that green, smelly lakes create large economic costs. These costs are real but hard to measure. For example: tourists are not attracted to Rotorua when stinking piles of lake weed crawling with

We were told of the testing of various rules of thumb to indicate the costs of each of the possible stage of intervention: from *exclusion* through to *control*. One rule of thumb is the belief that ***prevention is much better than cure;*** i.e. keeping weeds and pests out, rather than dealing with or living with new incursions. The data that Carla Muller presented to the symposium was consistent with ***an ounce of prevention being worth a pound of cure***, even though it did not fully prove the proposition.

Other lakes

Perhaps the best way to summarise the presentations on the Tarawera and Rotoehu Lakes is this: we have learnt a lot and there is much more good science available, but very much more is needed. Clearly, Rotoehu and the 8 Tarawera Lakes were shown to be major works in progress.

Rerewhakaitu

Farm Environment plans in the wider Tarawera catchments were discussed by Simon Park (LandConnect). Chris Sutton spoke about the Farming Collective Plans at Rerewhakaitu. In my view Chris under-sells himself and the importance of the Rerewhakaitu plans. These can greatly assist the implementation of the proposed National Policy Statement for Freshwater (it proposes the stimulation of groups around the country to link with the authorities).

At our first Symposium many years ago Chris Sutton accepted responsibility for his farm's discharges of nutrients. He went home and persuaded his fellow farmers to accept responsibility for their farms' discharges, and for the health of Lake Rerewhakaitu. Despite the best efforts of some bureaucrats, the Rerewhakaitu farmers managed to keep control of their programme over 18-19 years. Without decrying the good work done in the Rotorua catchment, Rerewhakaitu is a shining example of what is needed throughout the rest of country. Thank you Chris.

Thanks

Finally, thanks to all the presenters and organisers of the Symposium. Thanks to the Regional Council, Rotorua Lakes Council and Ministry for the Environment for the funding programme for the Rotorua Lakes. Thanks to Te Arawa Lakes Trust for their partnership. May I also congratulate Don Atkinson his great leadership of LWQS. Thank you all.