

56th LAKES WATER QUALITY SOCIETY ANNUAL REPORT – 2017

It is my pleasure to present to you my second annual report. For the Society, it has been an incredibly busy year which included the running of our successful “Trouble Makers” Symposium. In preparing this report, I took the opportunity to read my last year’s report and felt frustrated that many of the issues that we had identified in that report remain unresolved. The wheels turn relentlessly slowly but when one looks at the longer-term picture, we are making significant progress on a number of fronts.

Website Upgrade

We have just completed a comprehensive upgrade of the website to get us into a new era, you will note a simplicity of format and a powerful search tool, there is still some work pending but we think the presentation is pleasing.

You will note that your annual subscription is now online through the website. From our side this will provide us with an automated subscription and an updated email base. **I encourage everyone to pay their membership through the site even if you need to rely on your family for help.**

Everyone will need to fully register so that we have all details in the new system. This will enable email communication.

Our site is here - www.lakeswaterquality.co.nz

If you are unable to register on line, we will happily accept your cheque.

Annual Fees

Along with the website upgrade we have taken this opportunity to update our subscription.

Household subscription	\$ 20.00
Corporate subscription	\$100.00

In addition, we are asking members to consider donating to our research fund which will be separately accounted for. This fund is to be exclusively used for post graduate students undertaking research on the Rotorua Lakes through the Waikato University. We believe this will give further emphasis to ongoing research and is enthusiastically supported by the new Chair, Professor Troy Baisden. Your committee will look to underwrite this fund to ensure it gains momentum, I urge your support. You will need to do this as a **separate payment through the website.**

Bullhead Catfish

These critters are still there, up until 30th June 2017 there were 3272 caught. Since the spring a further a further 295 in Te Weta Bay, 8 on the northern shores outside the Te Weta, 8 in the southern geothermal area, 7 in the Okere Inlet and 4 in Okawa Bay have been caught.

Associated with the symposium BOPRC ran a one-day work shop, they were able to brainstorm the current programme and consider refinements. Lyndsay Chatterton and Prof Brendon Hicks confirmed the

programme being run is appropriate, we are likely to see some modification of nets and bait. The release of brown trout into Te Weta Bay will increase the predator pressure. Perseverance is essential.

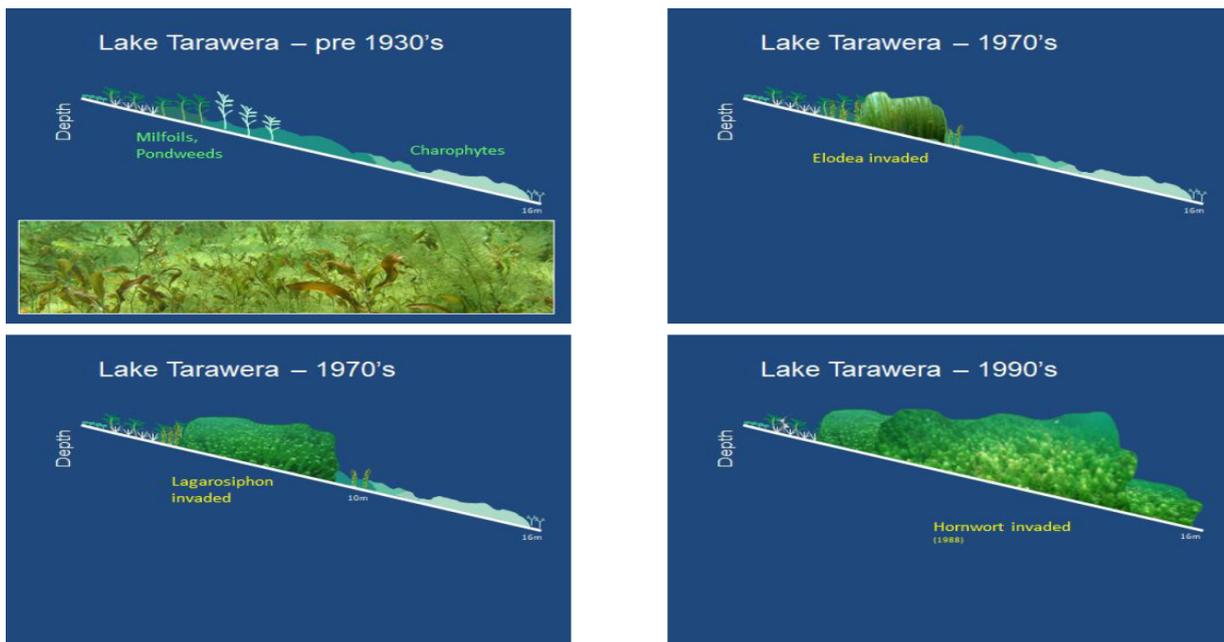
Endothall:

We are still awaiting a consent for Endothall, the advantages of this chemical are well understood and unfortunately we have been caught up in an Environmental Agency Review of their standards. Ultimately, it will mean Endothall can be applied with less restrictions than originally envisaged. It is the Number 1 chemical in the USA, but several other chemicals are currently being tested.

Aquatic Plants Plan:

These plans have now been developed and are in the early stages of consultation. They will provide the framework to allow the restoration of our flora. Since the Symposium, the Society has changed its position and we are now calling for the eradication of all invasive lake weeds from our lakes. We have seen success in the eradication of Hornwort from Lake Okareka and other small lakes around New Zealand. If we can achieve this in some lakes, why shouldn't it be our long term aspirational objective.

There is still a gap in the ability to scale up the use of Endothall for large lakes, so a proof of concept process will need incorporation into the plan. We have an opportunity to see the restoration of our flora while we still have viable seed in the lake bed. Over time it is inevitable that the viability of this seed bed will diminish so the opportunity of restoration would be lost. The loss of our native plants in the littoral zone is well illustrated with this NIWA slide from the Symposium, it is something I have evidenced, and we have waited too long to address it.

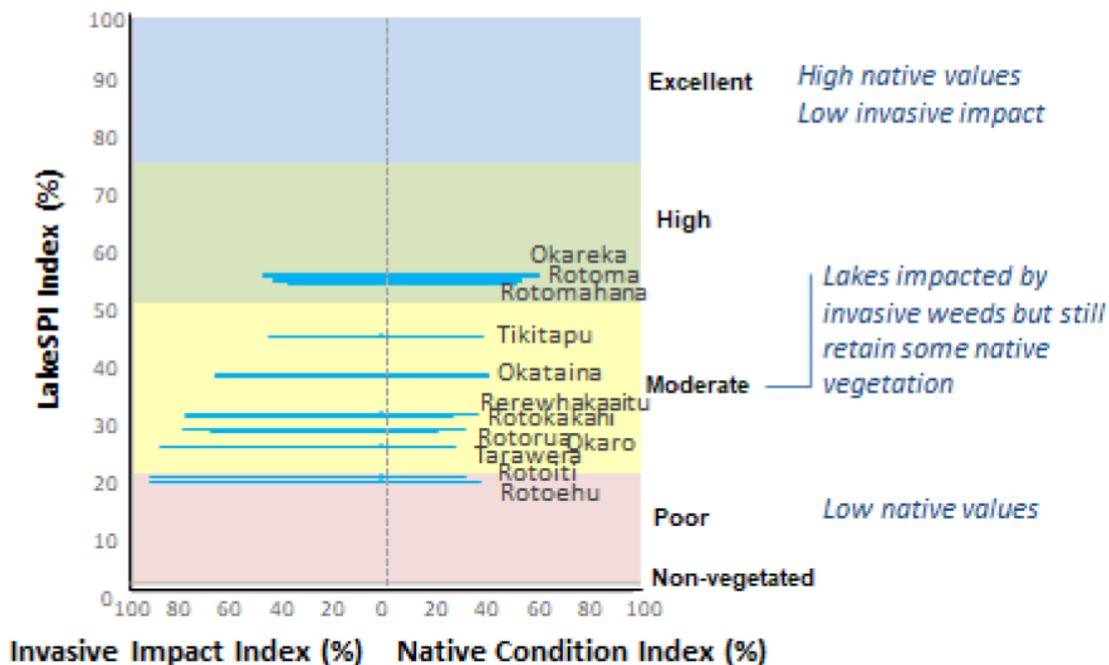


LakeSPI

This programme developed by NIWA monitors the state of aquatic native and invasive species. The table below illustrates how degraded our flora is. Note that Rotoehu and Rotoiti have a poor status and Tarawera is just above this. This is a national ranking index and illustrates just how bad we are and how urgent it is we address this travesty, all of which has occurred in my lifetime. We currently have a containment policy which is preventing further spread. Through the Aquatic Weeds Plan we want these weeds eradicated.

State of the Rotorua Lakes

LakeSPI 2015 to 2016 surveys



Plan Change 10:

This Rule governs the nutrient discharge from the Rotorua Catchment. The hearings process has been completed and now the advised rule has been appealed to the Environment Court. These appeals will be heard during 2018 and we are hopeful that they will be dismissed. Capping the nutrients into Lake Rotorua is the only sustainable way of ensuring restoration.

In 2018 the consent for continuing use of alum in Lake Rotorua will be heard, initial consultation is now taking place. This is considered the only way the target TLI can be achieved in the interim period of nutrient reductions from the catchment into the lake. Alum has proven to be very successful in flocculating out phosphorous and the lake is now at the targeted TLI, based on levels identified in the 1960s'. It is a fantastic success story for the city.

Sewerage Schemes:

The Rotoma East Rotoiti sewerage scheme is now out to tender and will be built in 2018. My congratulations to Ian McLean and the RLC Councillors for achieving this. The exclusion of the sewerage from Lake Rotoma should ensure the restoration of Lake Rotoma's TLI and ensure this lake remains our clearest.

The Tarawera Sewerage Scheme has had major impetus with the granting of 6.5m from Government. It is hoped with this seed money the scheme will ultimately proceed. Our congratulations to Libby Fletcher and Gen Snelgrove for achievements to date.

The Rotorua City plant upgrade will be a major capital commitment for the city but will not alter the cap on nutrients entering Lake Rotorua. It should greatly assist in the clean-up up of the Puarenga Stream as the nutrients, not captured in the effluent spray area of the forest, are discharged through the stream to the lake. The capital expenditure, through the implementation of world leading technology, will allow a

substantial increase in the capacity of the plant to accommodate growth within the city and around the lakes.

Ohau Diversion Wall and Okere Gates:

The wall has been consented for a further 35 years. Maintenance of the wall will be done on an “as required” basis and monitoring of this is being done to ensure the wall remains for a total of 50 years. The Okere Gates consent is currently being consulted and a cultural impact report has been received and comments are being sought. Both Hilary Prior and Warren Webber are actively involved in this. We fully support the current consent and the work being done by the Lake Rotoiti Community Association.

Consultation with Councils:

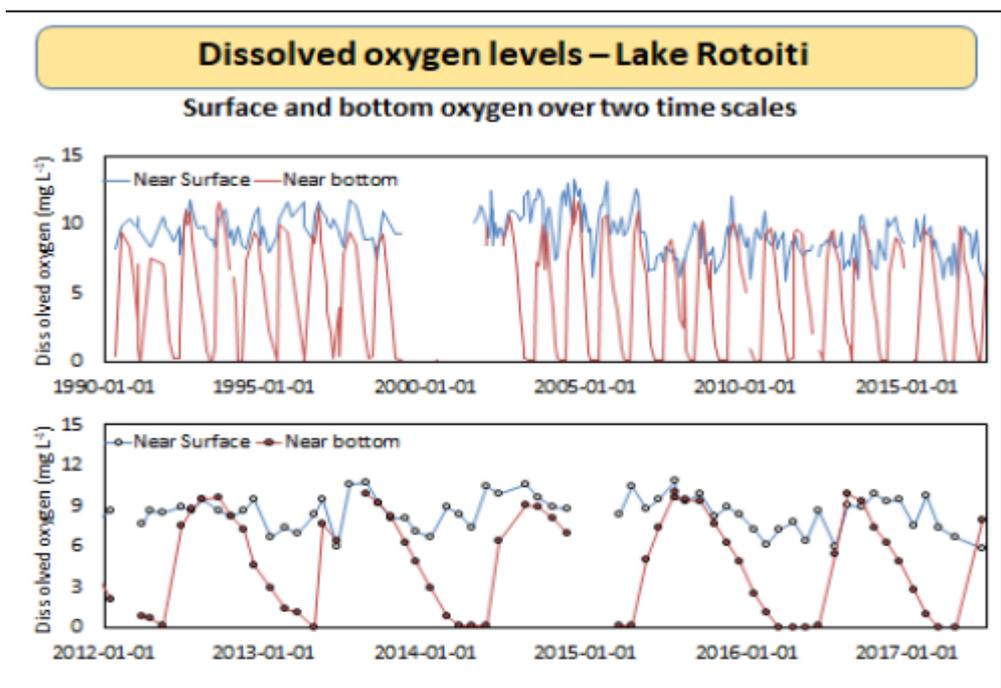
We continue to make submission to both Councils, this is an important part of ensuring our aspirations are understood. We meet with BOPRC executive bimonthly and the Weed and Catfish subcommittee quarterly. These exchanges are valued and appreciated. Recently we have commenced similar meetings with RLC and TALT.

Trouble Makers Symposium:

Highlights of the various sessions are listed hereunder.

Session 1 Scene Setting

David Hamilton, now Deputy Head of the Australian Rivers Institute, addressed four of our principal lakes. He noted in Lake Rotoiti the TLI has improved, but not the dissolved oxygen levels in the subliminal waters, see following chart. Rotoehu has not fully recovered even though it has come to an end of its capital programme, further work will be required. Lake Rotoma has seen a decline in oxygen levels, we are hopeful that sewerage reticulation will reverse this trend. Lake Rotorua continues to show impressive recovery under alum dosing. He noted by example in Lake Rerewhakaaitu that climatic impacts on the lakes by the end of the century could increase chlorophyll levels by 50% and decrease water clarity by 30%. The message here is we need to get our house in order now.



Lindsay Chatterton from the Nature Conservancy Great Lakes Project based in Chicago, was our key note speaker on invasive pest fish. He illustrated the devastating impacts they have seen on trout population and

outlined their use of environmental DNA technology to establish the presence of species and quantities in each water body. This tool has substantial potential for use here but will require significant development and is applicable across all of our water bodies. He also spoke of new targeted toxins that are being utilised.

Session 2 The Pest Fish Threat

Natasha Grainger, Department of Conservation spoke on the wide variety of pest fish in New Zealand and the species throughout our lakes and rivers. They have successfully controlled Koi Carp and Gambusia in several lakes and in Rotopiki controlled Rudd. These successes give us heart that we can eradicate cat fish.

Professor Brendon Hicks, Waikato University, detailed our current programme for the control of cat fish and illustrated how big the potential problem is in the associated slide.

How big could the problem get?

- Compared to 3.5 fish/net/night in Te Weta Bay....
- Catch rate in Lake Taupō in 1995 up to 92 fish/net/night

SITE TYPE	MEAN CATCH PER UNIT EFFORT (FISH NET ⁻¹ NIGHT ⁻¹)				
	LATE SUMMER	AUTUMN	WINTER	SPRING	EARLY SUMMER
Weedy	19.6	26.9	6.0	22.6	92.1
Rocky	5.5	39.0	41.0	23.5	34.3
Sandy	2.0	0.8	6.0	3.3	-

Figure 3. Two fyke nets containing 10% of the catfish caught during the study.



(Barnes and Hicks 2003)

Michelle Dedual, Department of Conservation Taupo, provided evidence on the diet of catfish, their liking of koura and fish eggs.

Session 3 The Lake Weed Menace

Tracey Burton, NIWA, provided evidence of the impact of weeds on Lake Tarawera as shown earlier in my report and updated us on the LakeSPI as illustrated earlier.

Legal status of introduced freshwater fish

Freshwater Fisheries Regulations 1983		Biosecurity Act 1993	Conservation Act 1987	HSNO 1997	No Legal Status
<i>Sports Fish</i>	<i>Noxious Fish</i>	<i>Unwanted organisms</i>	<i>Restricted Fish</i>	<i>Prohibited Organisms</i>	
Trout (2spp)	Koi carp	Koi carp	Grass carp*	Stickleback	Brown bullhead catfish+
Salmon (3spp)	Rudd (except A/W)	Gambusia	Silver carp*	Pike family	Golden orfe
Brook char	Piranha	[Gudgeon]		Any venomous fish	Naturalised - aquarium fish*
Mackinaw	Pike	[Marron]			Aquarium fish in captivity
Tench	Walking catfish	Channel catfish			
Perch	Tilapia spp.		Green - naturalised	Grey – only in captivity	Blue – not in NZ at all
Rudd (AW Fish & Game Region only)			Pink – possibly eradicated from NZ	Orange – can only breed in captivity	

+ Must kill on capture (Fisheries Regs)
 *goldfish, guppy, swordtail, sailfin molly, caudo
 * Animal Welfare Act 'pest'



Max Gibbs, NIWA, considered the oxygen demands related to the breakdown of weed in Lake Rotoiti and concluded that on a total lake basis it represented about 10% of the oxygen demand and therefore was not significant and weed control measures would not be detrimental to the lake. He did note that the western bays were heavily weed infested and would react differently.

Deborah Hofstra, NIWA, confirmed that in Lake Okareka, hornwort was found in 2012 and has since been eradicated, this is a good news story.

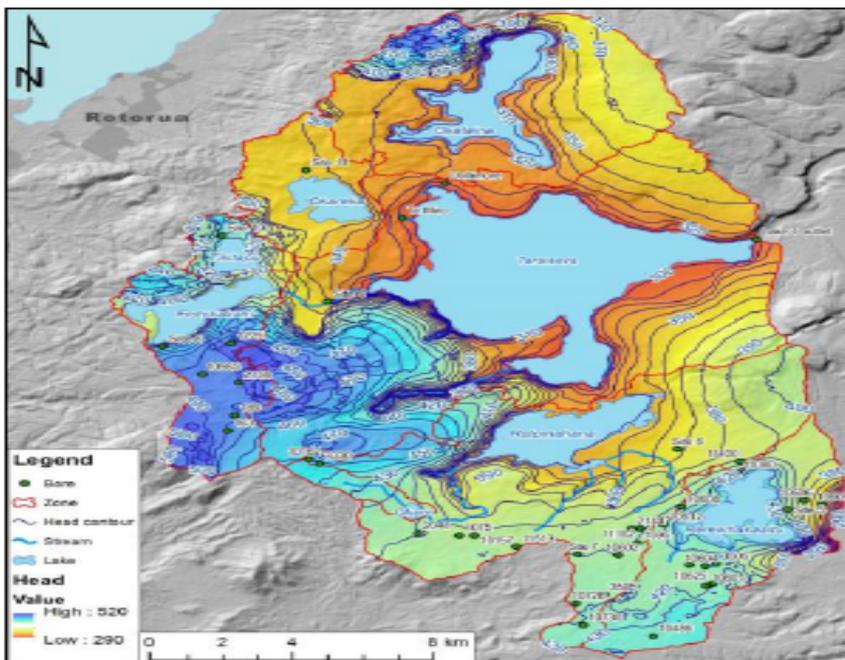


Mary de Winton, NIWA, confirmed the relevant regulations and plans that authorities work under and LINZ's responsibility for the management of aquatic weeds for the Crown under the Te Arawa Lake Deed Settlement.

Rowan Wells, NIWA advised that Endothall is the Number 1 weed killer used in the USA and has been successfully used in Northland, Waikato and the South Island. We are still awaiting consent for the Rotorua Lakes. To date success has been limited to lakes smaller than 6 hectares and concepts need scaling for large water bodies.

Session 5 The Eight Lakes of Tarawera

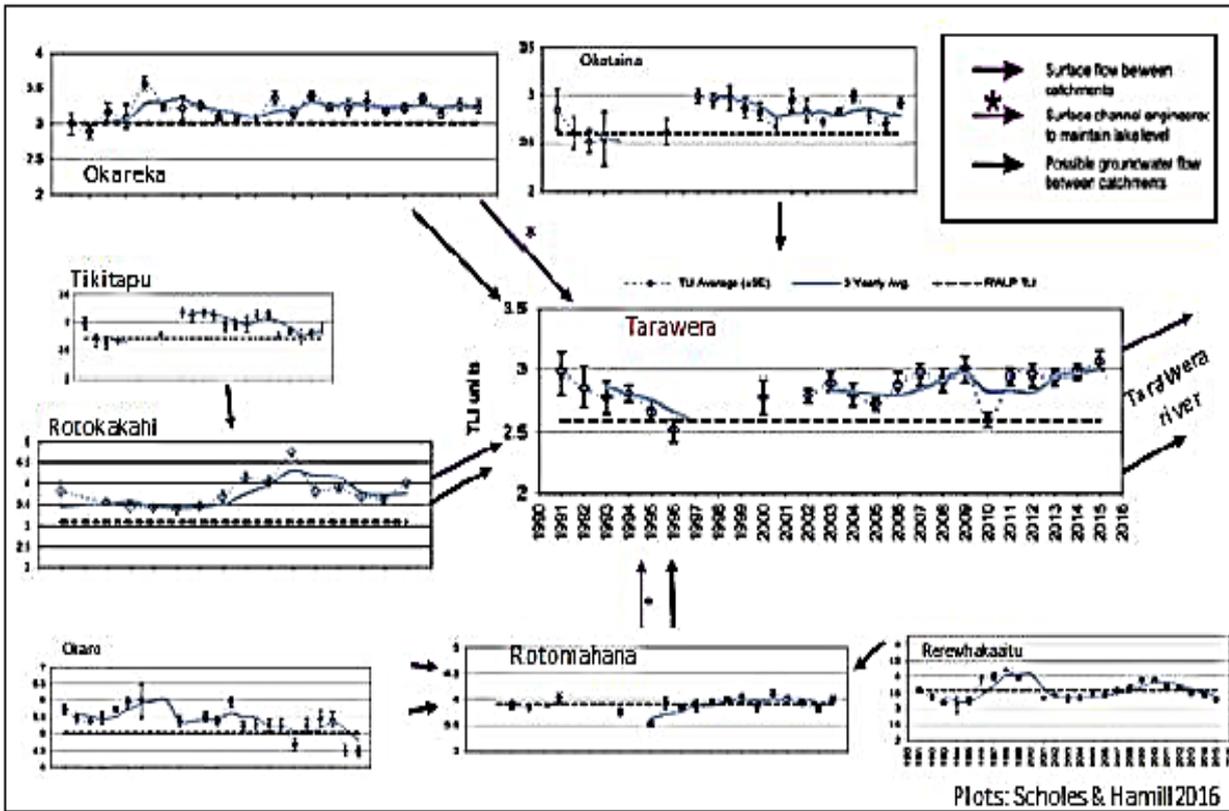
Martin Kessick, Deputy Director General, Biodiversity DOC, spoke on the Predator Free 2050 programme. Areas in excess of 20,000 hectares were being addressed without fencing, wallabies are currently not included in the programme, but are recognised by the Department and there is no diversion of existing funding as the result of Pest Free 2050. There is a significant opportunity in utilising gene editing and this has potential for large impacts in the future where all offspring are potentially only male.



Paul White, GNS Science, gave an address on the underground water system of the Tarawera complex and was able to illustrate the complexities of this. Ground water age is 10 to 40 years, relatively young compared to the Rotorua catchment.

Chris McBride, Waikato University, spoke on the

declining TLI of Tarawera, the rising phosphorus and nitrogen and the associated decline in oxygen. Chris is tasked with building the model for the Tarawera complex simulating the impacts of nitrogen and phosphorus on the TLI. We are anticipating the completion of this shortly.



Alistair Suren, BOPRC, considered the impacts of stream contamination by 1080, the impacts on koura and found no detrimental evidence.

Results: stream contamination

Despite regular monitoring 1080 detected *only once* (at very concentrations)

But what about 1080 in soil and groundwater??

The graph plots Rainfall (mm) and Flow (L/s) over time in 2009. The top panel shows rainfall with several peaks. The bottom panel shows flow with corresponding peaks. A legend indicates that green dots represent 'No 1080 detected' and yellow dots represent '0.1 µg/L 1080 detected'. A single yellow dot is visible on the flow graph around 25th Aug 2009.



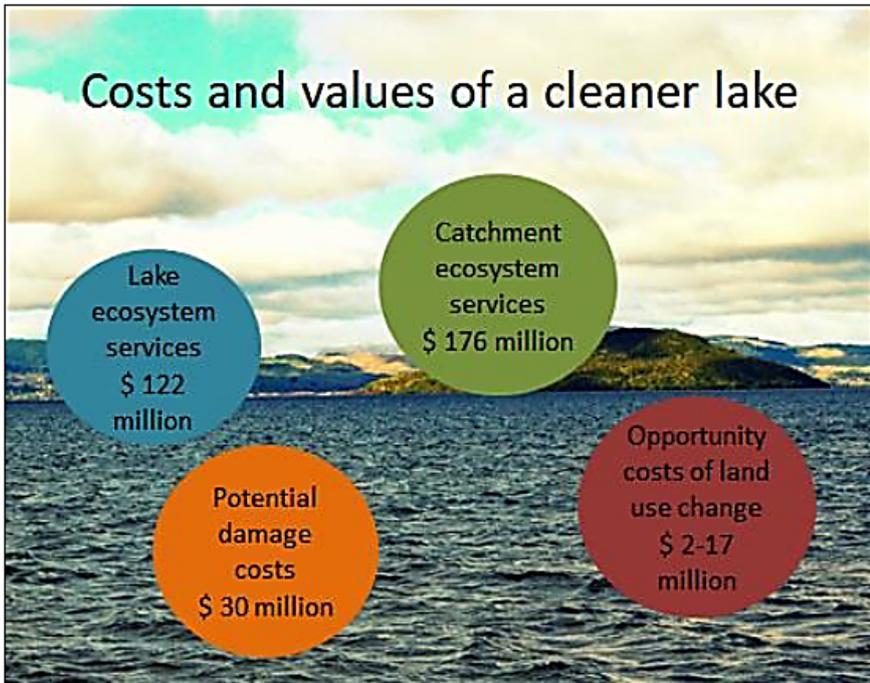
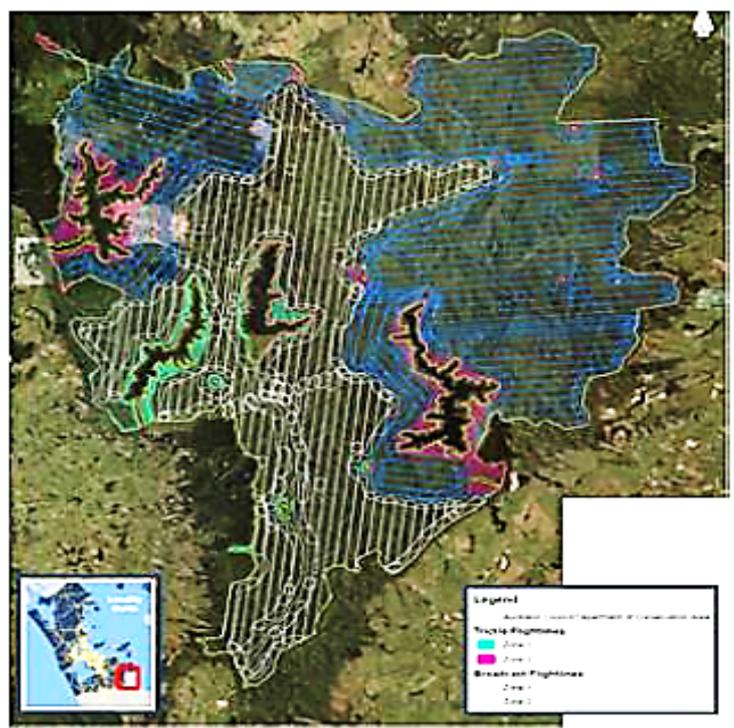
"...the government is hiding the truth and misleading our people..."
 1080 Eyewitness, Facebook, 16 February 2017

David Hansford, Investigative Journalist, gave a thought provoking address on Fake News, Rogernomics, Neo-liberal economics and how deeply impacted people by these and like events do not believe the science.

Mace Ward/ Rachel Kelleher, Auckland Council, provided a case study on the Hunua Ranges and the Auckland City water supply. The area was highly impacted by pest animals and by using precision helicopter application at low level per hectare dose rates, very effective control was achieved. The process was supported by seven Iwi groups in the area.

Peter Beets, Scion, considered the impacts of forestry on nutrient leeching, noting high losses post-harvest but very low losses over the balance period.

Chris Sutton, Rerewhakaaitu Farmers Group, provided an update on what has been done and proposed in mitigation of phosphorus.



Session 6 Responsibilities, Value and Funding.

Hannah Mueller, Kessels Ecology, provided evidence from her doctorate on the value of the lakes and their related eco systems and considered the costs of restoration and degradation. The value of these lakes to the well being of the district cannot be understated and it is pleasing to have this documented.

Greg Corbett and John Patterson BOPRC presented on the cost of pest management control, 20,000 hectares in the Tarawera complex, initial cost year 1 - \$1.4m, annual cost \$600k total \$12.1 m over 20 years.

Paul Champion and Rohan Wells, NIWA noted costs for the current programme was \$228,000 pa and speculated that total control cost to be in the order of \$12m.

Jan Hania, NEXT Foundation, spoke on funding provided by them and their requirements. The project needed to be transformational, inspirational, integrated across all systems and have scale.



NEXT FOUNDATION **Environmental Investment so far**

- Rotoroa Island (2008)**
 - A public conservation park and sanctuary for threatened species 83ha
- Project Janszoon (2012)**
 - Transforming ecological health of the Abel Tasman National Park
 - 2015 Green Ribbon Supreme Award winner – 22,000ha
- ZIP (2015)**
 - A partnership to design, evaluate and implement innovative technologies to eradicate and defend large scale areas from predators providing sustained protection for biodiversity
- Taranaki Mounga Project (2016)**
 - A large scale collaborative partnership project to restore and sustain ecological resilience to Taranaki Mounga
 - 34,000ha and beyond
- Predator Free Wellington (2016)**

Te Urewera / Poutiri-Ao-ō-Tane / Cape to City

Thanks to all involved

It is through the hard work of your committee we are making progress on our ambitious target of having all lakes meet their targeted TLIs(pre 1960's) and invasive weeds eradicated. My thanks to all my committee for the efforts and special thanks to Warren Webber for the symposium organisation and John Gifford for leading the webpage upgrade.

It takes a village to raise a child, it takes a community to restore a lake.

Don Atkinson
Chair