
Session Seven : Responsibilities and Funding

SESSION CHAIR – Ian McLean, LakesWater Quality Society

WATCHING FOR INVASIVE SPECIES: PUBLIC ENGAGEMENT

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Tracey is a scientist in NIWA's Freshwater Biosecurity team with more than 15 years' experience in undertaking and designing aquatic vegetation surveys, with a focus on the use of aquatic plants as indicators of lake ecological condition. In her role Tracey is also the regional co-ordinator of NIWA's education and public outreach activities and is currently exploring the potential for citizen-science volunteers and community groups to assist with the early detection of invasive aquatic species.

ABSTRACT

Invasive species continue to be one of the greatest threats to the Rotorua lakes and include not only water weeds and wallabies, but other organisms too. Invasive molluscs such as zebra and quagga mussels have the potential to cause wide spread devastation to our freshwater ecosystems and are just one example of other invasive aquatic species not yet found in our New Zealand lakes.

The management of invasive species is a shared problem that requires the cooperation and support of a diverse range of stakeholders, interest groups and members of the general public. The early detection of an invasive species is critical and may make the difference in being able to appropriately manage, control or eradicate a species before it has a chance to spread.

Anyone can help prevent the incursion and spread of invasive species into our lakes. In New Zealand, we can learn from the success of programmes in other countries where they are recruiting citizen scientists to look for anything new or unusual. Citizen science, broadly defined as the involvement of volunteers in research, provides a means of combining research activities with environmental education and public engagement in science. Volunteers are able to increase their knowledge and understanding of the environment, learn more about local issues of importance, and contribute to science based recommendations. In addition, observations collected by citizen scientists can provide valuable records and knowledge that otherwise wouldn't have been available.

TRANSCRIPT

Good afternoon, today I am going to talk about the importance of watching for invasive species, look briefly at what is here and what is not and look at ways in which the public may be able to help with watching for invasive species in their lakes.

Yesterday we looked closely at the weeds in the lakes and today have learnt much about the potential impacts of wallabies but we do not want to gloss over other invasive species that have the potential to pose a serious risk to the Rotorua region as well as the whole country. There are weeds not here yet that are much worse than the ones we have

already. We also have concerns for the spread of invasive fish into the Rotorua lakes. Didymo is in the South Island. So we need to remain vigilant in watching for these invasive species that are already on our doorstep.

There are other invasive species not yet in New Zealand that we must also be on the lookout for. **(Slide 1)** Freshwater invasive snail species and other molluscs such as the zebra and quagga mussels have the potential to cause widespread devastation to our freshwater ecosystems should they make their way here.

Slide 1



We do not have any of the major pest fish species in the Rotorua Lakes now but we do have the invasive mosquito fish. A programme this summer using students to carry out interviews around boat ramps focused on pest fish awareness and some suspicious fish sightings were reported. Luckily the only one that required validation was a goldfish found

Slide 2

Invasive fish

STOP THE SPREAD . . .
and keep Rotorua lakes free of pest fish

Report any sightings of **KOI CARP** or **CATFISH**

Koi carp 5-70 cm

Catfish 3-40 cm

Other fish of particular concern are rudd and gambusia.

YOU can help by

- **PHOTOGRAPHING** any specimens caught and forwarding to your local DOC office
- Following Check Clean Dry protocols

Why are invasive species a problem?

- Reduce water quality
- Can compete with native species and trout

It is **ILLEGAL** to possess, control, raise, transport or spread invasive species. (Freshwater Fisheries Regulations 1972)

For further information, or to report suspicious fish, contact your local DOC office or phone 0800 DOC HOTLINE

- Mosquito fish (*Gambusia affinis*) in most Rotorua lakes.

- Koi carp, Catfish, Rudd, Perch and Tench **not** here.
- High numbers in neighbouring regions increase the risk.

✓ CHECK ✓ CLEAN ✓ DRY

WWW.BIOSECURITY.GOV.TZ/CLEANING

on the edge of Rotoiti. However these reporting's should serve as a reminder that we need to watch out for invasive fish. Koi carp, catfish, rudd and perch (**Slide 2**) are well established in the Waikato Region and pose a great risk to these lakes. All lake users must remember the 'Check, Clean, Dry' messages that can help prevent the introduction or spread of pest fish and other invasive species into the lakes.

Slide 3

Didymo



WHAT WILL IT TAKE FOR YOU TO DO YOUR BIT?
Didymo (rock snot) could threaten the life out of our precious rivers and lakes. It could get ugly, but you can help prevent your biosecurity threat by following the 'Check, Clean, Dry' message. With us here for best results in the world working on the problem, your help can make a difference. The government is your friend and here to Check, Clean, Dry and spread biosecurity. Get us on call 0800 80 80 80.

- Didymo (*Didymosphenia geminata*) first recorded in NZ in 2004.




Photo: www.doc.govt.nz

- Currently only in South Island.
- Prefers lower nutrient environments.
- Risk low to Rotorua Te Arawa lakes?

☒ CHECK
☒ CLEAN
☒ DRY

WWW.BIOSECURITY.GOVT.NZ/CLEANING

Didymo (rock snot) was first recorded in New Zealand in 2004 (**Slide 3**) and is still only in the South Island, likely because of its preference for lower nutrient environments and colder waters. There is research now suggesting that it may not pose a significant risk to the Rotorua Region should it make it up this far but the message is the same, 'Check, Clean, Dry'. Before didymo hit the South Island it was given little thought and its impacts were not appreciated until it arrived. The strong message from this is that we do not know the impacts of invasive species until they arrived so we always need to remain vigilant. It is easier to prevent the arrival of new species into a lake than to try and control or eradicate them once there.



The apple snail (top left) can literally grow to the size of a small apple and the ear pond snail pictured at the bottom is one that I have a personal interest in. These two snails are both available through the aquarium trade in New Zealand and at my local markets near Cambridge there is a man who sells bags of ear pond snails, 10 for \$10, readily available. Despite their availability only one apple snail has been found outside of the trade, in the Waikato River in 2010. Following an extensive search of the river carried out by the University of Waikato no more were found. It was most likely released from someone's fish tank into the river and hopefully a one off.

These invasive ear pond snails can grow to about 25 mm wide, about the size of a 50 cent piece, and were recorded for the first time by myself and John Clayton during a survey of Lake Rotomahana in 2011. Since then they have naturalised in Lake Pupuke (Auckland), Lake Roundabout (a small lake in the South Island), and four other Rotorua Te Arawa Lakes, Tarawera, Rotoehu, and this year for the first time in Lakes Rotoiti and Okaro.

We carry out aquatic plant surveys in these lakes with scuba gear once every two years so are confident that these snails were not previously there. They are moving quickly between lakes. In Lake Rotoehu, the sheer numbers of these snails present in one of the bays was alarming. If I had been a swimmer in that bay I would have been crunching at least three of these snails with each foot step. We do not know enough about these snails to assess the risks involved. There may also be potential human health impacts associated as they can be vectors of different parasites but we are not sure.



There is also the Malaysian Trumpet snail (left) which might not pose a significant threat to a lot of New Zealand lakes because it has temperature requirements. However because of the thermal inputs in some of the Rotorua lakes, they are already in the Golden Springs area, more work needs to be done to see what the potential risks could be.

In my opinion one of the worst invasive species not yet found in New Zealand are the freshwater zebra and quagga mussel. **Slide 4** at the top shows an adult quagga and zebra mussel which are smaller than our native mussels (kakahia), at less than 5cm long. Both alien mussels are prolific breeders. Adult mussels, some only as big as a grain of rice, have been known to produce between half a million and a million eggs each year. These snails are present in the United States and still making the news as they continue to spread. They were first reported in the Great Lakes in Northern America around 1988, and have since spread through many states. They were found in Lake Mead in Colorado for the first time in 2007 and in October 2014 quagga mussels were found in a reservoir in

Slide 4

Quagga & Zebra mussels

DON'T MOVE A MUSSEL

Lakes Havasu, Mead, Mohave, Pleasant and the Lower Colorado River are infected with quagga mussels.

These pests damage boats, fisheries, recreation areas and water systems!

Before launching in this or any other body of water, please:

- Thoroughly dry the boat, engine, livewells and bilge spaces or
- Power-wash the hull of the boat and,
- Flush engine, live wells and bilge spaces with 140° water or vinegar.

Before leaving this lake, please:

- Drain the water from boat, livewell and the lower unit.
- Clean and remove all plant and animal material from the hull and trailer.
- Dry the boat and inspect all exposed surfaces.

Visit www.azgfd.gov/mussels for more information.

Quagga Mussel
Zebra Mussel

Photo Credit: USFWS

- Small, <50 mm long.
- Both prolific breeders – 500,000 eggs/year.
- Rapidly spreading

Photo: George Andrejko, Arizona Game and Fish Department.

the Heathrow area in London.

Slide 5



Slide 5 illustrates some of the problems resulting from these mussels which are of real concern. One problem is that while they are prolific breeders they are also great water filters. The immediate impact of abundant populations of these mussels is that water clarity improves. John Madsen talked about mussels in waterbodies causing a threefold increase in the water clarity which might be seen initially to be a great improvement. The problem is that they filter out the phytoplankton and suspended solids thereby interfering with the food web cycles. Suddenly the zooplankton and fish have nothing to eat. In the United States some fishing communities have completely collapsed as a result.

These mussels can fix on to any hard surface as can be seen in the photos above. Imagine the money involved in clearing mussels off hard surfaces: intake pipes, dams, harbours, jetties and other places. They have the potential to damage boats, propellers, anything that remains in the water for a long period of time. Boats are the main vector of spread between lakes.

Also disturbing is that because mussels fix onto any hard surface they could potentially attach to our native kakahi (freshwater mussels). Overseas they have been shown to climb on top of other species and push them into the sediment until they suffocate. The photo of a fresh water crayfish, looking very similar to our native koura, illustrates the disturbing consequence that they could be fouled by numerous small alien mussels; not very pleasant. But the problems created by these molluscs do not stop there. The once pristine sandy beaches surrounding lakes impacted by zebra and quagga mussels can become smothered in jagged smelly deposits of shells.

So weeds and wallabies are not the only thing that we should be on the lookout for when watching for invasive species in the Rotorua Lakes Region. Early detection is critical and can make the difference in being able to appropriately manage, control or eradicate a species before it has a chance to spread. We need to know where it is before we can do anything about it. Surveillance for invasive species is carried out by the Bay of Plenty Regional Council who are doing a great job. Last year they asked NIWA to look at their

surveillance practices and we concluded that they are doing everything right in terms of best practice and methods used. The study determined that the most successful methods for the early detection & delimitation of submerged invasive weed species continue to be in water visual methods using divers.

But it is not just a regional council or other authority's job to watch for invasive species. The management of invasive species is a shared problem that requires the cooperation and support of a diverse range of stakeholders, interest groups and members of the general public. Everyone has a role to play in preventing the incursion and spread of invasive species. Invasive species are spread predominantly by people; boaters, anglers, and even swimmers can unintentionally spread invasive species from one water body to another when invaders hitch a ride on their equipment. We have seen over the last couple of days the devastating consequences invasive weeds can have on the recreational, cultural and economic values. Fresh water systems are the most threatened globally and invasive species are the biggest threat to biodiversity loss in the Rotorua Lakes.



Anyone can help prevent the incursion and spread of invasive species into our lakes. A term loosely used at this symposium and gaining recognition around the world is citizen science. Citizen science can be defined as the involvement of volunteers in scientific research. It combines research activities with environmental education and public engagement in science. The main aim is to get any one interested from young children right through to those that are now retired to help answer real world questions about our environment and take ownership of the problem. Citizen science is not new, it has been happening since at least 1900s when community groups helped with bird counts.

Today's technological advances are increasing the popularity of citizen science around the world with tools such as GIS-enabled web applications that allow for the collection of large volumes data.

Smart phones, which allow observations to be recorded and validated using photos and apps. There are online portals for free data sharing and a raft of free online resources which means setting up projects and getting information out is suddenly cheap and assessable for so many people.

The benefits for citizen science are numerous but most importantly it increases the community's awareness of local issues; advances their learning, knowledge and understanding of the issues and can change attitudes. It is a philosophy change on how people connect with the environment and take ownership, and gives them some responsibility for their patch. Volunteers can participate in making science based recommendations which is important because they want to be involved. However, a successful programme involving citizen science must be a two way thing; it is not just people giving the scientists lots of data. It should benefit both parties. Scientists can use citizen scientists to provide valuable records and knowledge that otherwise would not have been available while volunteers can receive feedback and the benefits of seeing their data and knowledge contributing to something positive – they can make a difference. Some of the examples of citizen science occurring around New Zealand are:



- *King Tides Auckland Project* – ‘Snap the coast: see the future’ - asks members of the public to upload photos to help researchers work out what many coastal areas will look like in the future and to plan accordingly.



- *Annual Garden Bird Survey* - is an initiative set up to monitor the distribution and population of common garden birds around New Zealand. www.landcareresearch.co.nz



- *NIWA Snow Project* - asks volunteers in Christchurch to take regular measurements of snow fall and submit information via a phone app. www.niwa.co.nz
- *NIWA Stream Water Quality Project* - involves community volunteers in monitoring stream water quality and ecosystem health, in parallel to data collection by regional council staff.

Easily the biggest example of citizen science working in New Zealand was Nature Watch, a website run by the NZ Bio-Recording Network Trust which allows nature watchers to record and share information on birds, insects and plants. In the last 18 months over 85,000 photos have been uploaded with 5,000 observations from 785 observers. These types of initiatives are attracting great interest.



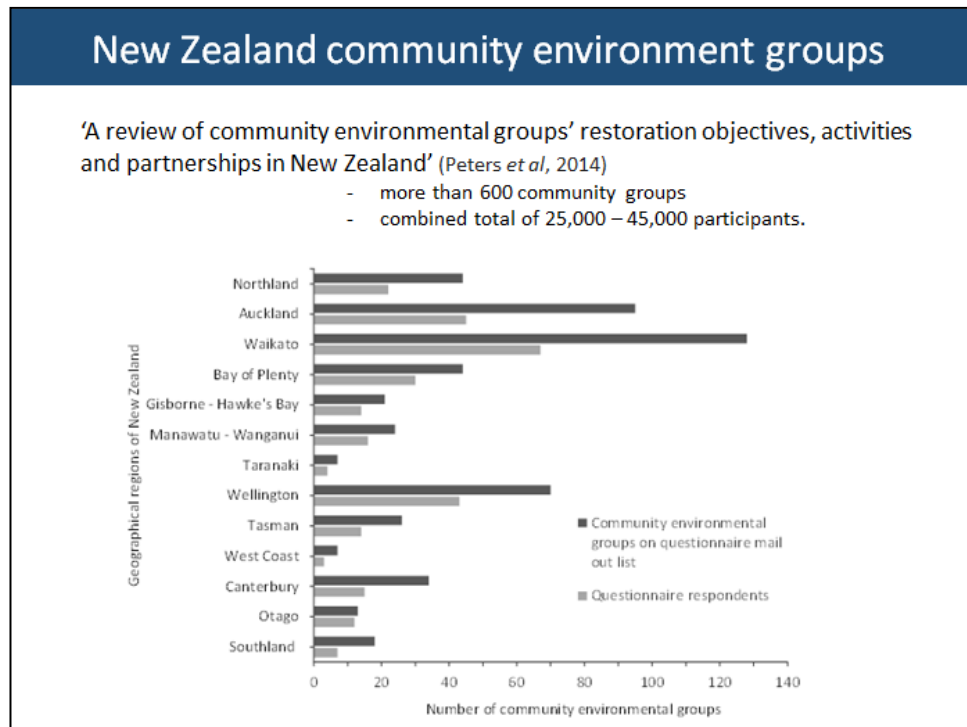
Another example that sits on the cuff of citizen science is Weedbusters which is a weeds awareness programme that aims to protect New Zealand's environment from increasing weed problems.



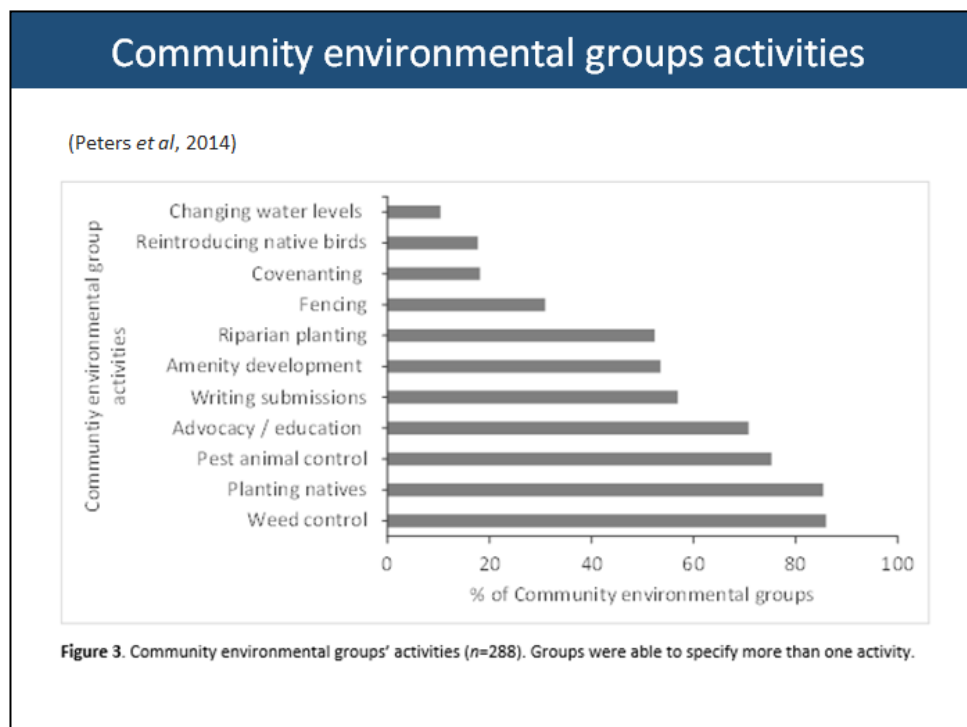
www.weedbusters.org.nz

Slide 6 and 7 show some results obtained from a review carried out by Monica Peters et.al. from the University of Waikato looking at community environmental groups in New Zealand. Her results showed that in 2014 we had more than 600 community groups active throughout New Zealand. Furthermore from questionnaires completed by 288 of these groups Monica's review was able to show the wide range of community activities that environmental groups are involved in. These types of activities also reflect the type of work being carried out by community groups in the Bay of Plenty Region.

Slide 6



Slide 7



Most of the active groups listed with the Bay of Plenty Regional Council include:

- Tarawera rat control programme – increased dabchick and native bird populations
- Landcare Ōkāreka - pest plant and animal control programmes around the lakes to benefit native bird populations including the dab chick
- Tikitapu Forest and Bird – pest animal control
- Ōtautū Bay, Lake Rotoehu – rat control programme benefiting waterfowl including dabchick



I think these programmes show that we already have people within the region who are interested in helping with environmental issues and perhaps the same groups could be utilised to help in the war against invasive species. The more eyes watching for invasive species the better.

In New Zealand, we can also learn from the success of programmes overseas where they are recruiting citizen scientists to look for anything new or unusual. Some of my favourites include the 'Clean Boats Clean Waters' programme in Michigan, USA, which aims to prevent the spread of aquatic invasive species in Michigan lakes. With more than 11,000 inland lakes you can see why they need as many eyes and ears for information on new incursions as possible. This programme offers volunteers training to educate boaters about where they are most likely to find aquatic invasive species. Based on a roster system they are present at the lakes year round and educate lake users on how to inspect their boats and trailers and demonstrate cleaning techniques as well.



<http://www.uwsp.edu/cnr-ap/UWEXLakes/Pages/programs/cbcw/default.aspx>

The Oregon Lake Watch Programme is another good example of where the public are able to help with the early detection of aquatic invasive species. Volunteers help with the detection of aquatic invasive species, the collection of long-term water quality data and encourage an appreciation of Oregon's Lakes. This programme has had some great success stories with the finding of three aquatic invasive plant species in 2013 as well as Chinese Mystery snails and Asian clams.



www.pdx.edu/oregon-lake-watch

Another great example of public engagement is the hydrilla hunt which happens in several states throughout the United States each year. Over a week volunteers, including school groups, help search local waterbodies to locate undiscovered Hydrilla infestations. They get in with their rakes, boats and underwater cameras all looking for hydrilla to map its distribution and presence. A webinar is used to instruct volunteers on the skills needed to identify hydrilla, what to do if they find a suspect plant, and how to record the areas that have been searched.



For example:

<http://www.niipp.net/hydrilla>

<http://www.lakegeorgeassociation.org/what-we-do/Citizen-Science/LakeGeorgeHydrillaHunt.asp>

Other great initiatives overseas include newsletters such as that put out by the US Fish and Wildlife Service called Citizen Science (www.fws.gov/pacific/iq/Spring2014). Others such as the Maine volunteer lake management programme (www.mainevlmp.org) offer a range of practical workshops including one on how to build a water scope, how to carry out surveys from a canoe and for carrying out courtesy boat inspectors. The Texas Invaders Programme (www.texasinvasives.org/invaders) is an innovative campaign where volunteers are trained to detect the arrival and dispersal of invasive species in their own local areas. Advances in technology have also seen a whole new wave of citizen scientist initiatives such as phone apps like that from the Invasive Species Strike Team (www.njisst.org) in New Jersey.

No matter where you look overseas the messages are the same as here. 'Stop Invasive Species from Spreading', 'Stop Aquatic Hitchhikers', 'Don't move a mussel', 'Stop Aquatic Aliens'. (Slide 8)

Slide 8

Overseas - message is the same!



FIGHT THE SPREAD OF AQUATIC INVADERS

TRANSPORTZERO.ORG

<http://neinvasives.com/resources/stop-aquatic-hitchhikers/>



STOP AQUATIC HITCHHIKERS!

Prevent the transport of nuisance species.
Clean all recreational equipment.

www.ProtectYourWaters.net







Clean, Drain and Dry your watercraft.

Stop Aquatic Aliens!

Protect New Mexico Waters.

www.wildlife.state.nm.us/ais



So we have established that the management of invasive species is a shared problem but what can 'you' do about it? What can our communities do about it?

The first thing is to know your enemy. We have to know what we are looking for and how to identify it before we can react and do anything about it. **(Slide 9)**

Slide 9



There are plenty of resources that can be used to find this information out. The New Zealand Freshwater Pest Identification Guide is available on the NIWA website (www.niwa.co.nz/freshwater-and-estuaries/management-tools). It has guides and fact sheets for all the invasive species of concern here and is a great place to start.

Know your lake by looking at the information available for each of the lakes on the NIWA LakeSPI (Lake Submerged Plant Indicators) reporting website (www.niwa.lakespi.co.nz). This site provides information on the types of submerged plants known to be in the lakes including invasive species so you can gain a better appreciation of what you might be looking for.

Watch for invasive species. If you know what invasive species look like that is great, but either way, always be on the lookout for anything different. Actively look, 'Oh, that looks a bit different', 'I haven't seen anything like that before', or 'That's a funny looking shell'. Spot things that are unusual and do not assume that somebody else will know about it. If you find anything suspicious contact the biosecurity officers at the regional council.

Help 'prevent the spread' is one of the most important things that anyone can do. The 'Check, Clean, Dry' message was originally promoted in New Zealand to help prevent the spread of didymo. More research is needed to validate this message for other aquatic pests in New Zealand but in general the principles are the same.



CHECK - Before leaving any lake or waterway always check your boats, (including the anchor wells and bilges) trailers, fishing gear and other equipment and machinery

CLEAN - Remove any weed or other debris and wash thoroughly all equipment (e.g. nets, machinery and footwear). Evidence supports the benefit of also using detergent or salt water mixes.

DRY - Once cleaned, dry completely inside and out then leave for at least a couple of days before moving onto a new waterbody.

Slide 10 shows operators of the Rotorua Duck tours checking for invasive weed species after visiting each of the lakes. You can see the guy up in the top corner is under the vehicle checking every little bit of space where weed could get caught. This is a great example of responsible eco-tourism in the region. The Rotorua Duck Tours were the first ones to detect the invasive weed hornwort in Lake Okareka.

Slide 10



In conclusion, we do need to remain vigilant against invasive species. It is not just weeds and wallabies that pose a risk to the Rotorua lakes. Management is a shared problem and we all have a part to play in the process. We already have community groups in the Rotorua region so there is an opportunity to harness their potential. We need to look at ways in which we can provide them with the knowledge to look for invasive species and be a part of the process. A successful citizen science programme needs to benefit both parties, it is not a one way process. Local residents and community groups have an important role to play in watching for invasive species. They are the ones on the front line, at the lakes on a regular basis, boating and fishing, swimming and walking around the edges. They need to know their enemy, what signs to look for and act on anything different or strange that they find.

I would like to thank my team at NIWA, particularly John, Paul, Mary and Rohan for their contribution to this talk. Thanks also to Stephanie Bathgate from the Bay of Plenty Regional Council who was a big help yesterday, and to the Lakes Water Quality Society. This has been a really valuable symposium, thank you.