BEST PRACTICE TOOLBOX FOR WHOLE OF LAKE WEED STRATEGIES

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TRANSCRIPT

Good afternoon everyone. I will talk about work I have been doing on the Regional Council's best practice toolboxes to provide management for a whole of lake weed strategy. It is a two year MBIE Envirolink funded project initiated in October 2016. The purpose is to gather together information held within regional councils and other organisations that manage aquatic weeds. It is endorsed by the Bio managers and the Surface Water Integrated Management Groups in regional councils.

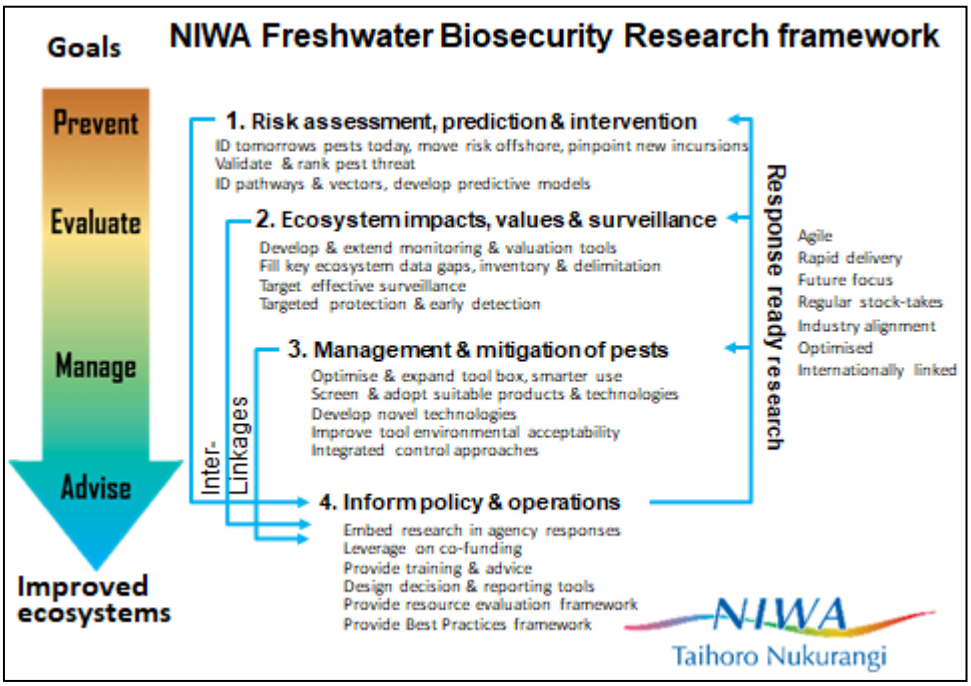
By the end of those two years we will have three tools:

- the strategic analysis tool (2016/17)
- the incursion detection tool (2017/18)
- aquatic weed control tool (2017/18)

There needs to be a strategic focus for aquatic weed management with best practice for weed surveillance detection and control programmes. Nationally these tasks are carried out in an ad hoc way. The Bay of Plenty is one of the better regions as far as a concerted programme. (Hamish Lass paper).

The strategic tool project includes collation of information received from regional council staff who undertake or oversee the management of aquatic weeds. The feed-back from field operations and new advances from research will continue to increase the efficiency and effectiveness of these activities into the future. It has potential application for all water body managers and central government agencies, for example, irrigators and power companies that rely on hydro power.

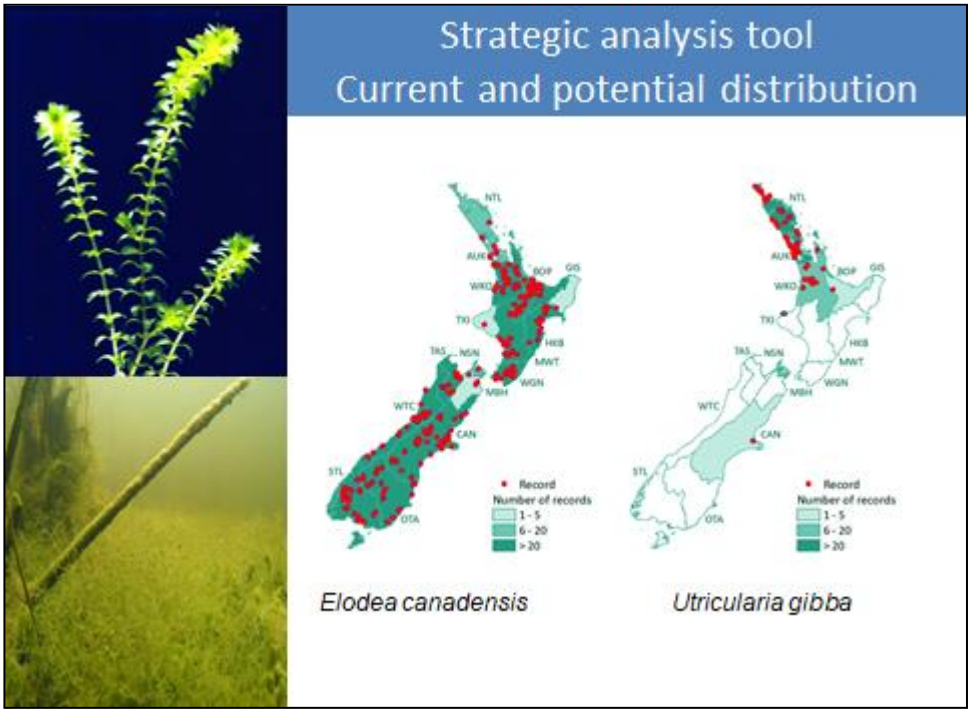
Our research programme covers three areas of research from prevention strategies through to management strategies, risk assessment prediction and intervention. We look



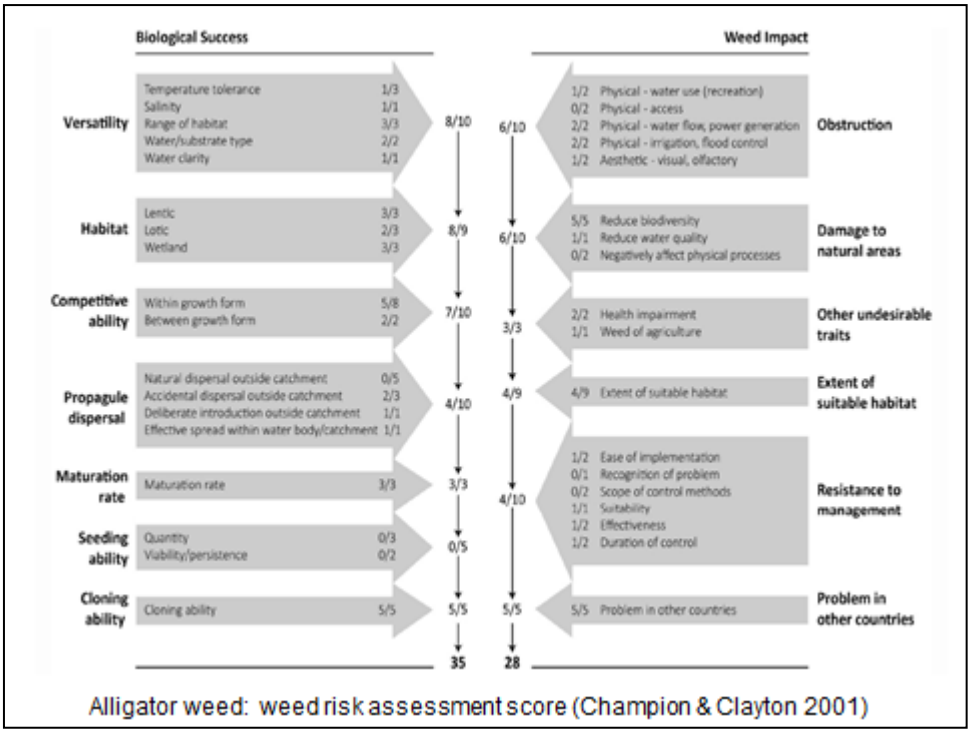
at species either already in the country or yet to be introduced to New Zealand, what risk they pose and the pathways by which they could be introduced and spread. We predict what systems are likely to be impacted, those of highest value, and how to target effective surveillance enabling water body protection and allowing early detection. By far the biggest part of NIWA's research, currently and historically, is focussed on control tools. The fourth part of our programme is making sure that the information is available to all management and policy agencies and this best practice framework fits this part of our research programme.

The Strategic Analysis Tool

This first best-practice tool is for strategic analysis, providing the rationale for aquatic weed control by evaluating the desired outcomes from management. There are several components - what are the problem species or potential problem species, where they are found now, where they could spread and what risks do they pose? We have developed an Aquatic Weed Risk Assessment model to assess those risks (Champion & Clayton 2000). Finally, the National Policy Statement on Pest Management (2015) outlines the classifications of control aims they recommend for use in Regional Pest Management Plans.

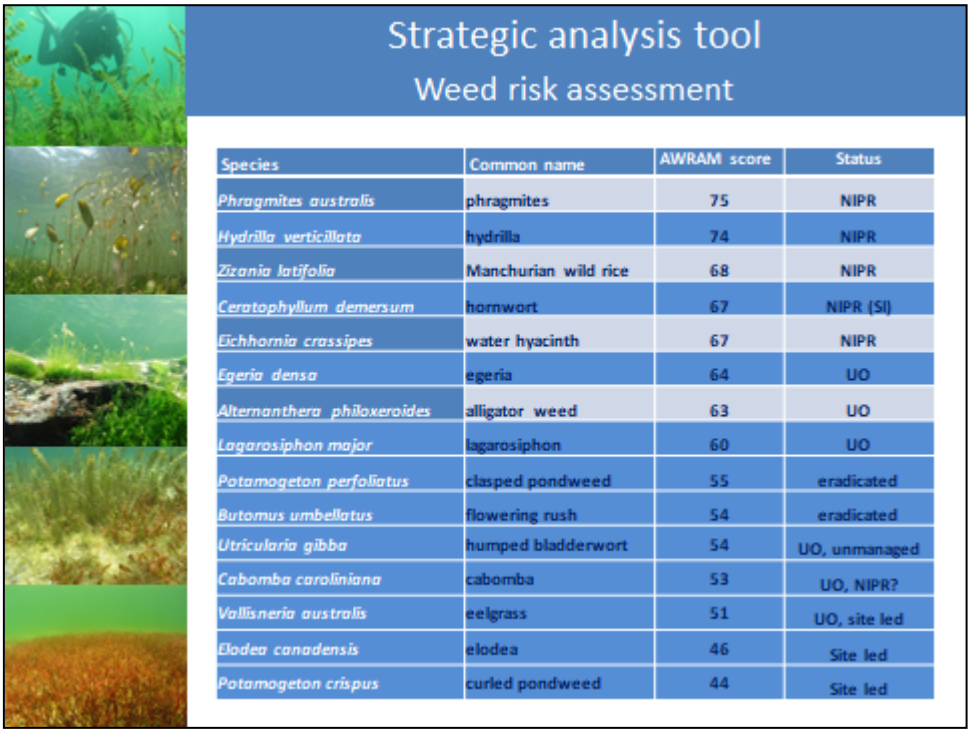


This provides two examples of pest species and where they occur. *Elodea canadensis* is widely spread throughout the country, introduced in the 1860s; it was deliberately spread around with the liberation of trout. Northland is too warm for trout so there is not much elodea there. Conversely there is a new weed *Utricularia gibba*, bladderwort, detected up north around the turn of this century. It was discovered in 1999 and over the next decade, (in 7 years) it had spread right throughout Northland, Auckland and into the north of Waikato. This year (2017) we found it for the first time in Taranaki. Unlike most submerged weeds, it is spread by waterfowl. There is one pond site in Rotorua and an aquarium site in Canterbury.



Alligator weed: weed risk assessment score (Champion & Clayton 2001)

This is the Weed Risk Assessment for alligator weed (*Alternanthera philoxeroides*) which is a major weed in the Waikato system and coastal Bay of Plenty. John Clayton and I worked on a model that outlines biological success and weed impacts of aquatic species (Champion & Clayton 2000). All generic weed risk assessment models rank most, if not all, aquatic plants as potential major weeds with no separation between them. The Aquatic Weed Risk Assessment Model looks at the range of suitable habitats, how competitive they are, how they disperse and their reproduction; all biological data. Then there are the weed impacts; obstruction, damage to natural areas, existing distribution and how much they could spread, resistance to management and finally whether they are a problem in countries with a similar climate.



Species	Common name	AWRAM score	Status
Phragmites australis	phragmites	75	NIPR
Hydrilla verticillata	hydrilla	74	NIPR
Zizania latifolia	Manchurian wild rice	68	NIPR
Ceratophyllum demersum	hornwort	67	NIPR (SI)
Eichhornia crassipes	water hyacinth	67	NIPR
Egeria densa	egeria	64	UO
Alternanthera philoxeroides	alligator weed	63	UO
Lagarosiphon major	lagarosiphon	60	UO
Potamogeton perfoliatus	clasped pondweed	55	eradicated
Butomus umbellatus	flowering rush	54	eradicated
Utricularia gibba	humped bladderwort	54	UO, unmanaged
Cabomba caroliniana	cabomba	53	UO, NIPR?
Vallisneria australis	eelgrass	51	UO, site led
Elodea canadensis	elodea	46	Site led
Potamogeton crispus	curled pondweed	44	Site led

The Strategic analysis tool generates a score and gives the top 8 aquatic weeds in the country. The ones with the solid blue lines are submerged species. The worst weed is *Phragmites australis*. The three weeds causing problems in the Rotorua Te Arawa lakes; hornwort (*Ceratophyllum demersum*), egeria (*Egeria densa*), lagarosiphon (*Lagarosiphon major*), are amongst the top 8 worst weeds in the country.

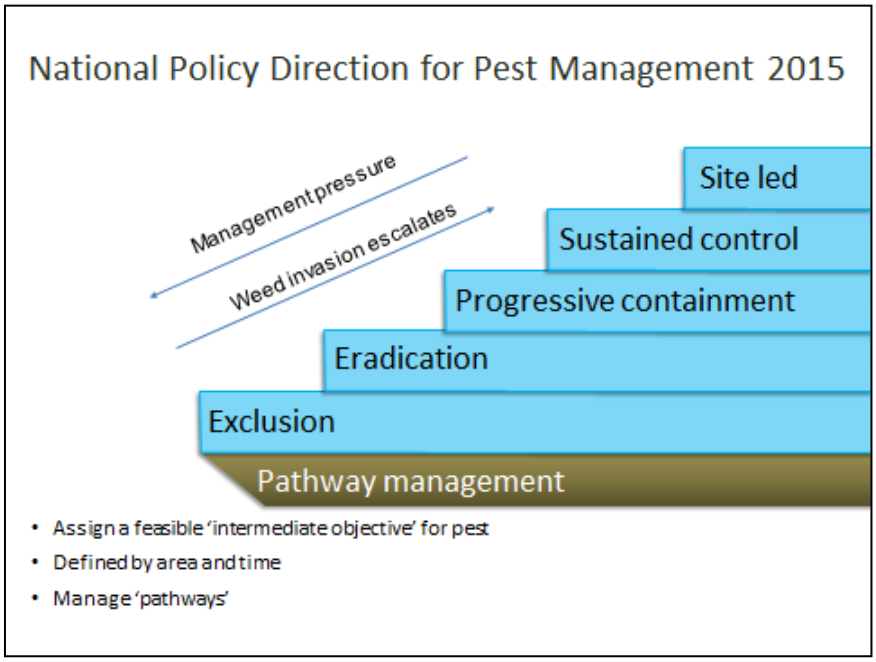
The next slide shows six species that have Natural Interest Pest Responses with these programmes managed by the Ministry for Primary Industries (MPI) targeting eradication. Hornwort was targeted for eradication from the South Island in 2008 and has been achieved. Hydrilla (*Hydrilla verticillata*) is targeted for eradication nationally. No plants of this species have been found in the last two surveys (two years) in any of the water bodies for the first time.

There are up and coming weeds. This is *Cabomba caroliniana* with a Koi carp (*Cyprinus carpio*), a photo from Paremuka in Henderson. This is the first field sign of this weed in New Zealand. In Australia, it is a weed of national significance but it has been in the aquarium trade in New Zealand for around 50 years prior to the detection of this site. MPI have now declared this plant an unwanted organism so it is no longer traded legally.

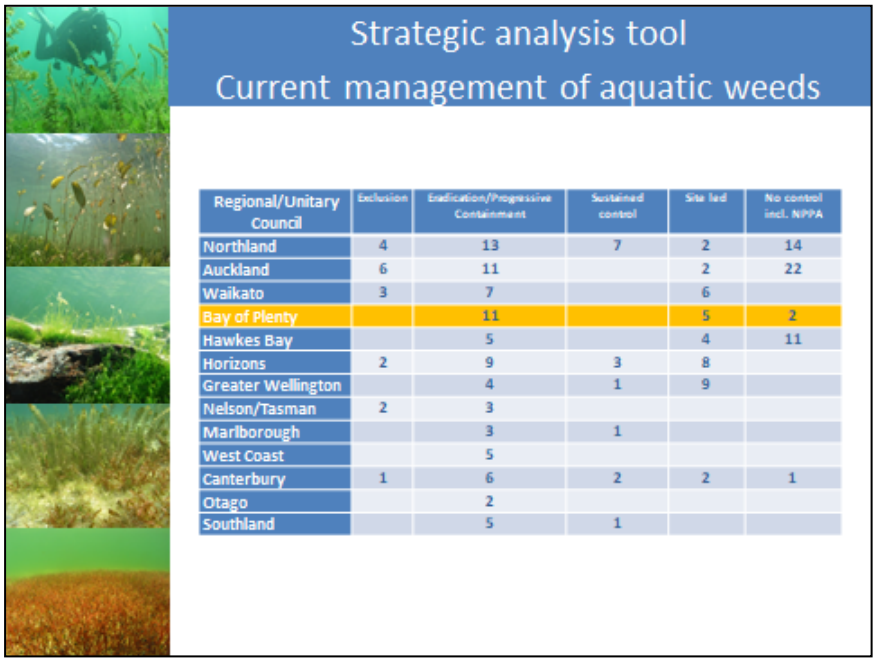
There are other species like this pond weed *Potamogeton perfoliatus* which have been eradicated from New Zealand and hopefully will never threaten us again.

MPI provides some common language in the National Policy for Pest Management 2015. There are four immediate outcomes in a set of conceptual steps on a management pathway which could go up or down depending on the pest's status or the goal of management and their ability to amend strategies. The scale of the strategy application maybe a contained water body, or a site within a water body, or even on a catchment scale. Firstly exclusion - no new pests coming into the region. Next is early detection and these new pests going into an eradication programme. Progressive

containment is similar to eradication, working towards that aim but over a longer time period. Sustained control is about amenity control and site-led management is protecting special areas from the impact of weed species.



We surveyed all the regional councils about the aquatic plants they manage and the Bay of Plenty were similar to the Northern North Island area with 11 aquatic species targeted for eradication from the region and five site-led species, many of which are being well managed in several of the Rotorua Te Arawa Lakes.



Regional/Unitary Council	Exclusion	Eradication/Progressive Containment	Sustained control	Site led	No control incl. NPPA
Northland	4	13	7	2	14
Auckland	6	11		2	22
Waikato	3	7		6	
Bay of Plenty		11		5	2
Hawkes Bay		5		4	11
Horizons	2	9	3	8	
Greater Wellington		4	1	9	
Nelson/Tasman	2	3			
Marlborough		3	1		
West Coast		5			
Canterbury	1	6	2	2	1
Otago		2			
Southland		5	1		

The Incursion Detection Tool

This came from the strategic tool identifying regional threats and prioritising a framework for surveillance; where to look, how often, the risks and pathways. There is no point identifying threats and not doing anything, so detection leads to an incursion response.

The incursion response sequence starts from pre-planning to when containment actions are established.

Human Dispersal - Human activity is the only mechanism of spread for many aquatic weeds. Contaminated boats and trailers, nets, association with ornamental ponds and aquaria, and even some control tools like weed harvesters are good weed spreaders as well as weed managers.

Pathway Management - The number one priority is to prevent. Hamish Lass's photo below shows weed cordons installed at boat access points to the lake that focus the detection of any new incursion to within this netted off area, which therefore reduces the surveillance zone considerably.

Decontamination - Check, Clean, Dry is a message everyone should be aware of. It came from the Didymo campaign. Last month Tracey Burton did a project funded by MPI to see if those protocols hold for other aquatic pests including lake snow, pond snail and our

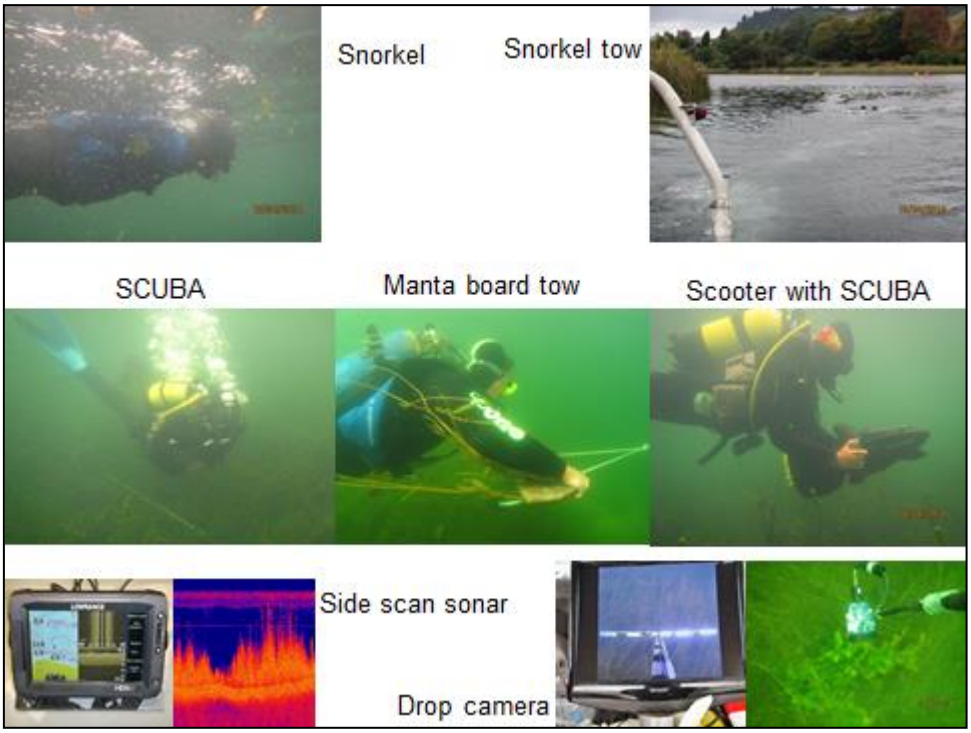
three worst weeds. They were all treated in all of the recommendations that are on the MPI website. The only treatment that effectively killed all of these plants was using water that you can actually get out of your immersion heater at home, which has to be 55 degrees and more, and that was absolute control of all of the species tested.

In the United States they use wash-down facilities similar to the one that Hamish showed us but using hot water. The other successful method is freezing but there are not too many freezers big enough for boats.

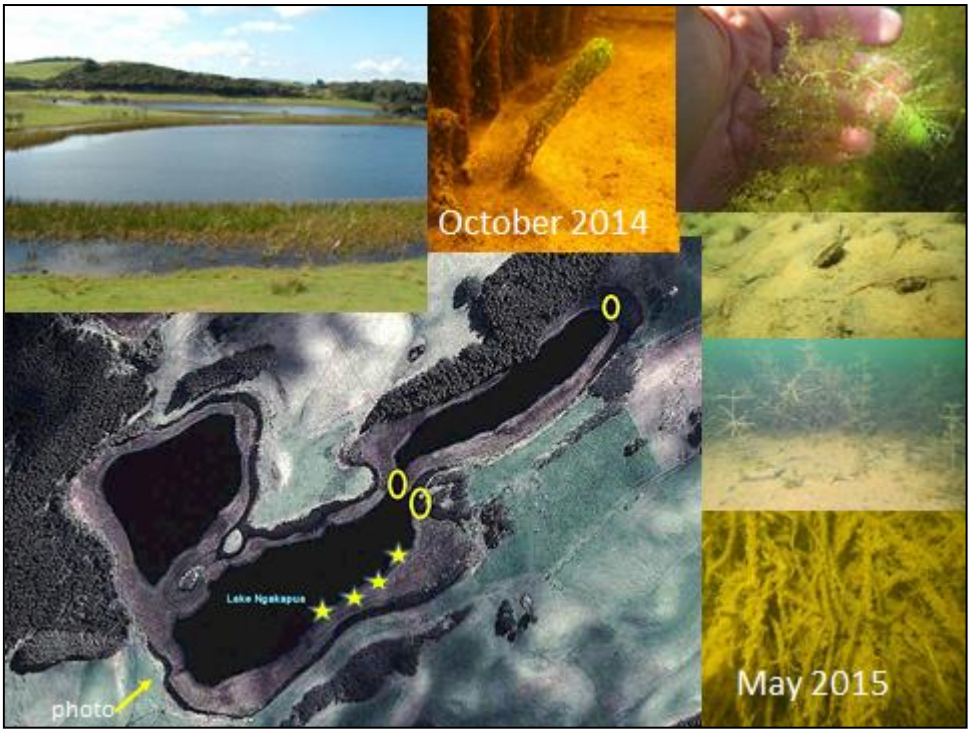
NIWA were contracted by the Bay of Plenty Regional Council to do a complete assessment and validation of their surveillance practices. The trials focused on new and existing surveillance techniques and methods capable of detecting new invasive weed species of concern in the Rotorua Te Arawa lakes. The most feasible methods from our review were tested in trials carried out in Lake Okareka which followed on from recent issues with hornwort detection that challenged surveillance detection capabilities and compromised timely management responses.

There were 6 trial sites, 12 divers and the detection targets were totara tree branches. This photo shows a totara branch looking very much like another aquatic weed.

They used a range of techniques including snorkel and diving either with scooters, manta boards and remote sensing. Detection was dependant on visibility. We found that the Bay of Plenty surveillance activities are consistent with best practice.



Below is an incursion response example in Lake Ngakapua in Northland. NIWA carries out an ecological assessment of high value lakes every 5 years with the Northland Regional Council and annual surveillance where there is a high incursion risk. Lake Ngakapua was seen as low risk but lagarosiphon was detected in April 2014. A year later endothall was used and removed the target weed, but retained all native vegetation/fauna including big beds of kākahi and an endangered bladderwort which were unharmed throughout the treatment.



The Aquatic Weed Control Tool

The control toolbox looks at the physical, mechanical, habitat manipulation, chemical and biological control approaches including:-

- the species effectively controlled by each option (including eradication, on-going control, spread prevention)
- recommended approaches (e.g., in the case of herbicide control: rate, additives, application technique)

It also looks at the legislation affecting the use of those control methods, ensuring legal constraints to their use are followed. Finally monitoring of control to record effectiveness of control, off-target impacts and to improve the approach is included.

This slide shows the range of control options available at different phases of weed invasion. In the case of Lake Rotoiti aquatic weeds have essentially occupied all available habitat, so the only options are harvesting, bio control using grass carp and herbicide.

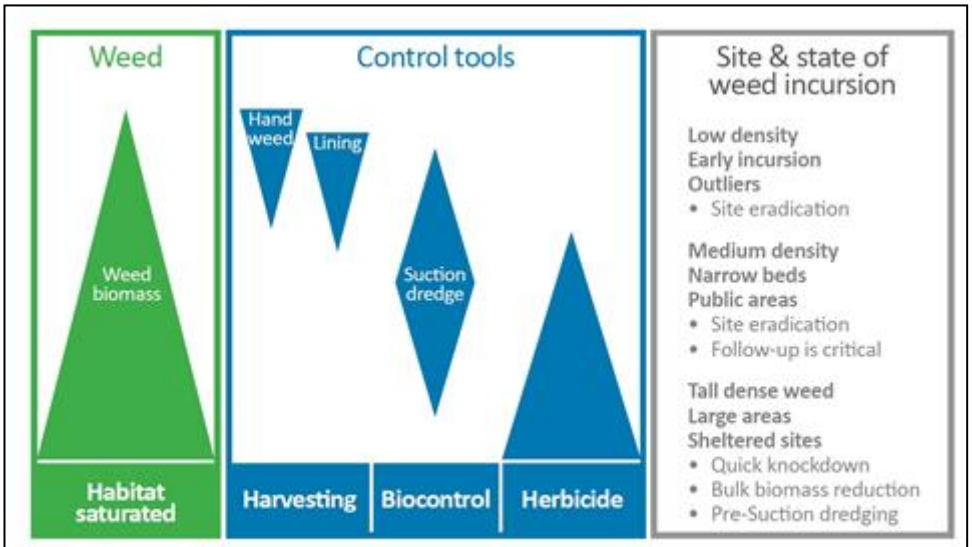
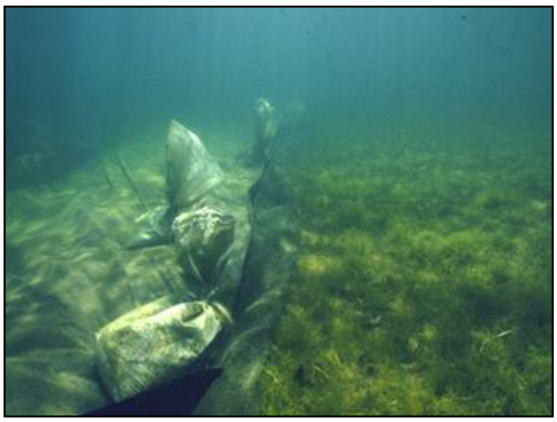


Fig. 8.1 Key factors for consideration when selecting an appropriate weed control tool. Weed biomass (green, left), site and state of the weed incursion (grey, right) determine the selection of control tool or tools (blue, centre)

Control tools

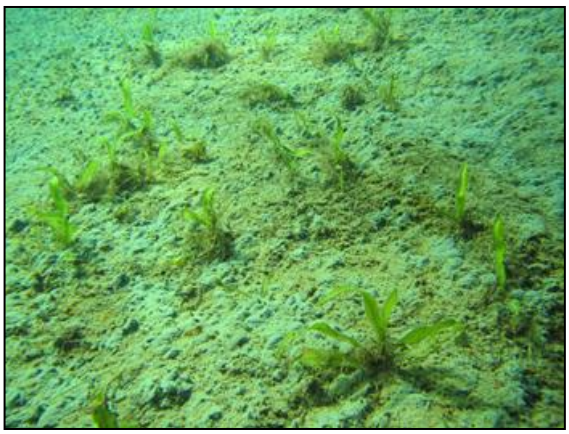
Hand weeding is very effective when you get an early incursion and have good underwater clarity.

Bottom lining – This is at Rosie Bay, Lake Waikaremoana, where lagarosiphon was covered with opaque material. Until recently we thought this method was restricted to very small infestations.



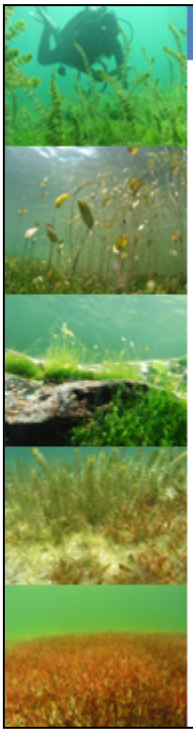
Suction Dredge – Up another scale to remove weed, using a suction dredge guided by a diver.

Hessian matting - Boffa Miskell have been trialling the technique that Deborah Hofstra talked about. There is a cost saving by laying big areas of hessian matting compared to suction dredging.



There is a bonus if native species like these pond weeds (below) grow through the weft of the hessian whereas lagarosiphon has a much thicker stem and will not penetrate through the mat.

Harvester - in one of the Waikato River hydro lakes.



Nationally eradicated species

Species	Common name	#	UO	NPPA
Butomus umbellatus	flowering rush	1	No	No
Eichhornia paniculata		1	No	No
Menyanthes trifoliata	bogbean	2	Yes	Yes
Nymphoides peltata	fringed waterlily	2	Yes	Yes
Pistia stratiotes	water lettuce	2	Yes	Yes
Potamogeton perfoliatus	clasped pondweed	2	Yes	Yes
Typha latifolia	greater reedmace	1	Yes	Yes
Zizania palustris	annual wild rice	1	No	No

We have eradicated a number of species nationally. Hopefully they will never be reintroduced back into New Zealand. The problem is when you get rid of a problem it is out of everyone's sight and if biosecurity is effective, nothing changes. When there is a big problem at the bottom of the cliff that is when everyone gets upset. Biosecurity is about stopping things before this happens.

I would like to thank all of the team at NIWA Aquatic Plants Group - Angus and Don McKenzie who were involved in setting up the Envirolink Fund, Darion, Randall, Andrew and Rachel, who make up the technical advisory group, Marcus Girvan from Boffa Miskell, who has been using the hessian and funding from the Strategic Science Investment Fund, NIWA's fund and also funded projects from MPI, Bay of Plenty and Northland Regional Councils.

Thank you very much.