Summer — 2002

Protect

Our mission: "To preserve and protect New Zealand's natural resources from the adverse impacts of invasive pests."

Protect

Summer 2002

Magazine of the New Zealand Biosecurity Institute

Contents

Editor's Note

This issue marks something of a sea change for *Protect* with the website up and running and promising to get more sophisticated, and the ending of the wonderfully helpful role that Monsanto has played in the production of the magazine.

The New Zealand operation of Monsanto has been sold and it is no longer able to produce the hard copy of *Protect.* I'd like to take this opportunity to pass on the Institute's gratitude to the people in the Johnsonville office of the company who printed and compiled the issues over the years, especially Linda Robertson.

As a result, the hardcopy of this issue is printed at a commercial printer at an increased cost.

In this issue

Wendy Baker who had a profile in the last issue, again features with a summary of the study trip she undertook to Australia last year looking at community-based initiatives for combating weeds. The Institute, along with other organisations, contributed to the expenses of the trip by way of the first NZBI Travel Award. The initiatives she saw operating across the ditch hold a lot of promise for implementation here in New Zealand.

For 2002, the NZBI Travel Award which helped her, and the NZBI Study Award, are now open for application until June 30. Application forms accompany this issue of *Protect* (see below).

Denis Glover wrote the poem, and now the rapacious nature of magpies is coming under the microscope in a study running at sites up and down the country to gauge the impact these birds are having on other birds.

A new area of *Protect* starts this issue — Practical Control Tips — with a summary of trials undertaken by Wellington Regional Council in to best methods to control wild ginger, with information the WRC distributes to property owners needing to control the weed.

Did you know that there has been, on average, one plant arriving in New Zealand every two to three days — 144 per year — since Europeans started settling here. With some many streaming in, it is imperative that screening is in place to reduce the risk of a potentially harmful plant arriving without excluding potentially beneficial plants. A second article by ecologists Bill Lee and Peter Williams lays out the thinking behind the screening process.

The ubiquitous willow has long been the standard plant for river protection around the country. But with the arrival of willow sawfly in the country there is a growing realisation that dependence on a single species may not be sound thinking in the long term. Margaret Stanley looks at the weed potential of some alternatives.

Is a deer more of a threat to New Zealand's ecology than a rat or a wasp? A survey carried out recently came up with some interesting results about Kiwi's perception of pests.

What role does climate change play in biosecurity issues? Would a warm year be enough to let a mosquito species capable of carrying disease get established in New Zealand. Dr Andy Reisinger looks at models that are attempting to gauge such a risk.

And lastly — just a load of bilge water! Work is under way on a database to help analyse the risks to this country's marine environment from ballast water. Determining where a ship is coming from, which New Zealand port it is bound for and what cargo it is bringing or planning to load while here are all factors involved in surveillance for unwanted marine organisms. Debra Wotton of the Ministry of Fisheries outlines the risk assessment process.

Files and attachments:

As normal this issues comes in two formats — email and hard copy.

At the back of the hard copy will be two additional sections: The Executive's Publicity recommendations, and the application forms for the Travel and Study Awards.

In the email edition, the additional sections will arrive as additional attachments named **Publicty.pdf** and **Awards.pdf**.

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News from the Executive

Website

Well we finally did it! We now have a presence in cyberspace (see www.biosecurity.org.nz) Thanks very much to the Cawthron Institute for providing us with the domain name and to Mike Harré for designing the site and getting it up and running. Mike has agreed to be our website manager and will be responsible for on-going design and maintenance.

Developing a "Members Only" section will be the next priority. A forum will be held at NETS2002 to discuss how well the website is working, possible improvements and new developments. If you have any queries or feedback in the interim please contact myself (hayesl@landcare.cri.nz) or Mike (reddwarf@ww.co.nz).

We are keen to advertise any upcoming branch activites or other relevant activities under "What's On?" so please forward any details through to Mike. Further updates about NETS2002 will be added to this section too as they come to hand.

NETS2002

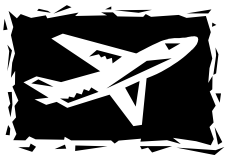
Speaking of NETS2002, I've just been down to Invercargill and I can report than planning for "Southern Exposure — The Roaring 40s" is well under way for July 24-26. The venue at Ascot Park is superb with a choice of hotel rooms or motel units, several bars, a restaurant, and even a bottle store. There is an excellent area with an indoor heated pool, spa, sauna and gym equipment (for those who like to sweat a little) so we have decided to hold a beach party there on the second night! So you will need to pack your togs, Hawai'ian shirt, and jandals, as well as your polar fleece.

For those of you worried about the cold, you will barely need to poke your nose outside of the whole heated complex unless of course you decide to come to Stewart Island. This optional field trip will be held on the Saturday, July 27, with the choice of returning the same day or staying overnight. Remember to book early to get the best airfares and that it's cheaper if you stay over Saturday night. Why not make a winter holiday out of it and pop through to Queenstown or Wanaka for a spot of skiing? If you haven't experienced these South Island treasures before, rest assured that they are truly stunning in the winter — come and see what all the fuss is about. We are also hoping to have an early bird fee for those who register early.

This year the conference will naturally have a southern flavour, including the dinner which will feature local delicacies such as Bluff oysters. It will be a great opportunity to learn about the unique area known as the 'Roaring 40s', as well as the latest developments in biosecurity, and a chance to catch up with old friends and make new ones. An exciting line up of speakers is planned, including an international guest speaker, and covering the entire spectrum of biosecurity issues. There will be in-depth workshops, and the public and schools will be invited to a special session to help raise biosecurity awareness and allow them to "ask the experts". It's still not too late to offer to give talk (even if it is only five-minutes long), or suggest a topic that you would like covered (contact Keith Crothers: keith.crothers@envirosouth.govt.nz). While we can't guarantee tropical weather in July we can bet on warm southern hospitality!

Travel and Study Awards

At our last AGM we agreed to offer two new scholarships — one for an NZBI member to help them to undertake some travel to gain new skills, and the other for a student to help carry out some relevant research. An Awards Subcommittee comprised of Peter McLaren, Mike White, Helen Braithwaite, has now developed some guidelines for awarding these scholarships, and we are now calling for applications (see **Awards** attachment file). Please note that applications close on June 30, 2002.



Late last year, we received an outstanding application from Wendy Baker for assistance for a trip to Australia to study community weed initiatives. The Executive agreed that this was exactly the type of thing that we were wanting to support and decided to award Wendy $1000 to top up her Queen Elizabeth II Technician's Award. A summary of what Wendy learned on her trip is contained in this issue and Wendy will also be telling us first hand at NETS2002.

Publicity

A Publicity Subcommittee (Peter Berben, Carolyn Lewis, Melanie Newfield, Rod Smart and myself) have come up with a set of recommendations for raising the profile of the NZBI and biosecurity issues without over-extending ourselves and breaking the bank (see **Publicty** attachment file for recommendations that have been approved by the Executive). They include things

News from the Executive Continued

like putting out press releases, having a public session at NETS, approaching a bank about having a nationwide single-theme campaign, printing some generic posters, and advertising in relevant magazines. More on this later when we have worked through the details.

Skills Register

Don't forget to complete and return the short questionnaire that we sent out with the last issue of *Protect* that will help us to develop a skills register for our members. If you need another copy of the questionnaire please email Dave Galloway (dgalloway@arc.govt.nz). Please send any completed ones to Dave too.

New Members

We would like to extend a warm welcome to the following new members:

Barry Green and **Kathryn Whaley**, Auckland Regional Council
Sara Barber, DOC, Northland
Jenny Williams, Environment Canterbury
Clarence Jeffery, Environment Waikato
Malinda Matthewson and **Trudy McNie,** horizons.mw
Erin Kearney, Hutt Valley District Health Board
Hamish Cochrane, University of Canterbury, School of Forestry
David Hurst and **Mike Urlich**, Wellington Regional Council

Biosecurity Strategy

As you all know the Government has undertaken to develop a biosecurity strategy for New Zealand (see www.biostrategy.govt.nz). Our Strategy and Policy Sub-committee (Mike White, Paul Champion, Andrew Wilke, and Ian Popay) drafted a submission on behalf of the NZBI and this was submitted just before Christmas (see page 6). There will be another opportunity for input later this year when the draft strategy is released.

On other policy matters the NZBI has recently written to ERMA about streamlining processes for importing plants and well-known biological control agents to reduce the risk of illegal activities. We have also written to MAF asking if we can have an NZBI member on the Technical Working Group responsible for overseeing the National Plant Pest Accord.

Biosecurity Symposium

The New Zealand Plant Protection Society is planning to hold a one-day Biosecurity Symposium on August 12 — the day preceding their annual conference — at the Centra in Rotorua. The main emphasis will be on scientific research and associated capabilities, possibly also touching on policy matters like developing a Biosecurity Strategy for New Zealand, and giving various people an opportunity to outline their perspectives on biosecurity in general. The NZBI has requested a slot to explain our roles and activities. For more information contact Lois McKay (lois.mckay@agresearch.co.nz) or visit their website (www.hortnet.co.nz/publications/nzpps/index.htm).

NZIPMO

Recently we made an approach to the Vertebrate Pest Management Institute of New Zealand (formerly New Zealand Institute of Pest Management Officers), who despite going through all the same sorts of difficulties that the NZBI has also had to overcome, seem to be determined to keep going. We have suggested that perhaps the two institutes could work together more closely in future and perhaps even run some joint activities? They have come back to say that they are amenable to the idea and will be discussing our suggestions for working together more closely at their next executive meeting.

Subs

A reminder that subs are now due again (our financial year runs from January-December). Now that the NZBI is getting more active and taking on new initiatives it is extra important that we get subs in as early as possible, so please pay promptly. If you do not wish to continue as a member please let myself, Ken Massey, or Dave Galloway know as soon as possible so we don't waste time chasing you.

Volunteers to Help With *Protect*

We are looking for some more people to help us to source stories for this magazine. The job is not onerous, as our editor can write the stories once pointed in the right direction. Any assistance would be appreciated — even one article a year. Please help us to produce the best possible magazine for our members.

Bye for now
Lynley ☺

Submission on the Development of a Biosecurity Strategy for New Zealand

The following is a copy of the letter sent by NZBI's Strategy and Policy Subcommittee to the Biosecurity Strategy Development Team late last December addressing the issue of a biosecurity strategy for New Zealand.

The New Zealand Biosecurity Institute (NZBI) is an incorporated society with membership open to anyone interested in biosecurity issues. Our mission statement is "to preserve and protect New Zealand's natural resources from the adverse impacts of invasive pests". We currently have about 160 members covering a wide range of groups and individuals who are involved in the management of biosecurity in New Zealand.

We were disappointed to see that the NZBI was only mentioned once in the Issues Paper, and only then listing our role as co-ordinating regional pest management activities. Less than half of our members are regional council staff and rather than providing a means to co-ordinate regional pest management operations (which was never our role) our organisation provides a forum (through branch and national meetings and newsletters) for updating science and management initiatives in biosecurity, improvement of field techniques, and increasing public awareness of actual and potential biosecurity issues. Predominantly the current focus of the NZBI is post-border biosecurity, but we are rapidly evolving into a group representing all facets of this topic.

The NZBI represents the vast majority of eyes and ears on the ground and many years of experience at looking for new pest incursions and managing a wide range of pests in New Zealand. Collectively our key strengths lie on the practical side of implementing legislation, applied biosecurity research, and providing education for both field staff and the general public. We therefore feel we have a major role to play with the formulation of a biosecurity strategy for our country and request that we be included in all future consultation on this matter.

Many of our members have already prepared submissions on your Issues Paper for their employers. To avoid duplication we have decided to comment on three issues only in this submission, that are of great importance to our members (national leadership, responses to recent incursions, and education and training in biosecurity), rather than focusing on specific questions in the Issues Paper. However, we would be happy to provide more detailed responses on any of these questions if required.

National Leadership

The Commissioner for the Environment states in *New Zealand Under Siege* that biosecurity should be accorded the same level of importance as national security. Biosecurity breaches could seriously affect the livelihoods of many New Zealanders. Yet, at the present time, we have no specific ministry charged with the responsibility of protecting the nation against such serious economic and environmental threats.

Time is very much of the essence if we are to achieve containment of new incursions and operate in the most cost-effective manner. The present set up, where there is often much confusion about who should be responsible and buck-passing, does not deliver this (as illustrated by the recent painted apple moth example). Setting up a specific biosecurity ministry could overcome the deficiencies of the current situation by providing clear leadership and identified lines of responsibility, and national co-ordination to ensure seamless delivery of pre-border, border and post-border biosecurity activities in New Zealand. This ministry could be more proactive and have a clearer mandate to resolve biosecurity issues without delay, since its role would not be confused with other agricultural, forestry or fisheries responsibilities.

This proposed ministry should have both the legislative power and personnel to co-ordinate all operational biosecurity activities within New Zealand. This ministry would ideally be staffed by personnel with hands-on experience in biosecurity management, and have the power to pull together and fund response teams with appropriate expertise to deal with any biosecurity issue. A register of expertise in biosecurity should be collated for organisations/individuals in New Zealand (or overseas should the expertise not be available here).

Submission on biosecurity strategy continued

Response to new incursions

Creation of a single biosecurity ministry would allow faster and better co-ordinated responses to new incursions. The ministry could administer a specific new incursion response fund that would allow action to be undertaken immediately. New incursion response plans must be developed for a range of organisms if they breach border controls. Such plans should include responses to organisms that affect not only the primary sector but also biodiversity, human health, the environment and Maori interests. They must be developed in conjunction with stakeholders and should include stakeholder involvement when the plans are implemented.

A higher level of surveillance is needed to detect new incursions. Recent improvements in pre-border and border surveillance systems protect the primary sector well. However, more emphasis needs to be placed on assessing pathways and implementing programmes for organisms affecting areas other than trade and the primary sector. The following points must be considered when developing a properly funded and targeted national surveillance programme:

- Current border surveillance tends to end at entry points (ports, airports) and does not include active surveillance for species other than a few that affect primary production and trade.
- Programmes tend to be initiated in reaction to the discovery of new organisms rather than from programmes designed to actively seek such organisms.
- Many recent new incursions have been detected by observant and knowledgeable members of the public rather than by focused surveillance programmes.
- Existing programmes fail to take into consideration the naturalisation process of introduced plant species. Plant incursions are generally not as rapid as other incursions and do not attract the same priority as those of other organisms.
- Marine biosecurity is particularly poorly served in the surveillance area.

Education and Training

One of the most important tasks of the biosecurity strategy should be to educate the New Zealand public about biosecurity issues and make them aware of how vital biosecurity precautions are to the survival of our country, industries, and way of life. This is especially true for Kiwis travelling overseas. Ideally public awareness and education initiatives should be co-ordinated nationally. The Max the Beagle campaign is a good start. Perhaps powerful advertisements, like the road safety ones, should be used to highlight the risks? All forms of the media should be exploited (web, television, radio, papers, leaflets, advertisements etc), and it would be useful to have a high profile person to head the publicity campaign. Kids in schools should routinely be taught about biosecurity threats. Exporters of produce also need to be warned of the dangers of exporting our pests and diseases to other countries.

Few people in New Zealand understand the principles of biosecurity, and more people need to be trained in the key concepts. This applies to existing biosecurity staff, but also to others in regional and local government. The public must have easy access to trained people who can identify and advise on suspicious organisms, if they are to be encouraged to act as eyes and ears for new invaders. Nursery staff and gardeners should be encouraged more to watch for fresh escapes from cultivation, as well as new arrivals. Trade journals, gardening magazines and websites, discussion groups could be better used to educate a wide range of people involved in the biosecurity industry.

We also need to promote better education about biosecurity issues internationally, especially in the Pacific Islands, where a lot of our produce and visitors originate. More information about biosecurity should be made available to all people who visit our country. Notices, websites, and information leaflets could be used more extensively and feature more languages. We also need to get better buy-in from tourist agencies.

News from the Branches

Northland/Auckland Branch

Alison Gianotti, Branch Secretary

At the end of February, the Northland/Auckland Branch of the NZBI held a very successful meeting at Wenderholm, hosted by the Auckland Regional Council.

A number of interesting seminars were presented which generated lots of discussion.

Jon Sullivan (Landcare Research) outlined a recent joint study undertaken in Northland by Landcare Research and DoC to answer the question; How important are settlements as sources of weeds for forest fragments? In February 2001, 18 pairs of settlements/ forest fragments were surveyed. Analysis of the results showed that 73.2% of the variation in the exotic plant species in the forest fragments could be explained using one variable, the number of houses less than 250m from the fragment boundary. Freshly dumped garden waste was found in 45% of the fragments with houses less than 250m away, suggesting one obvious mechanism for this trend. Possible solutions to this problem include weed-free sub-divisions, preventing or limiting housing near important reserves and community education.

Claire WooldridgeWay and Dan O'Halloran (DoC) then gave us an overview of their work fighting pests in Puketi Forest. The main problems are possums, pigs (which spread Wandering Jew), pigeon poaching on horseback (which spreads *Selaginella*), dumping of garden waste, weeds from old Forest Service dumpsites, prevailing winds (which spreads moth plant from Kerikeri), and flooding of the river systems (which spreads weed fragments and seeds). Recently they have been controlling isolated clumps of *Bartlettina,* and removing Mexican Daisy from riparian areas by handpulling! A dramatic decline in mist flower has been noticed following the release of the white smut fungus close to Puketi in 1998. Native plants are now present in areas once occupied by mist flower. Unfortunately, Wandering Jew, *Selaginella* and Mexican Daisy are also more apparent.

Next, Chris Winks (Landcare Research) provided us with an update on the release and establishment of the mist flower gall fly in New Zealand. A total of 9300 gall flies were released at sites throughout Northland, Auckland, Coromandel and Wellington, in 2001. Establishment of the gall fly has been confirmed at nine of the 15 sites checked so far. Chris is pleased with results to date and hopes establishment will be confirmed at more sites when they are checked in the autumn.

Rod Smart (ARC) then related the events followed the discovery of Fine Stem Needle Grass (*Stipa tenuissima*) in garden centres and on display at the Ellerslie Flower Show, labelled as *Poa spp*. Newspaper articles alerting the public to the weed, also referred to as Texas Needle Grass and Mexican Needle Grass, generated 100 enquires and resulted in approximately 250 plants being removed. On one property, single plants of *Stipa gigantea* and *Stipa ramosissima* (also known as 'pillar of smoke') were also found. Rod has discovered lots of websites (which may be of interest) bursting with hardy, cold-adapted, pest-free *Stipa's*, that are not banned from sale or distribution and therefore are readily available and can be legally imported.

The websites include;

http://herbarium.usu.edu/stipaea/Austrost.html
http://herbarium.usu.edu/grassmanual/Tribes/Stipaea/Nassella.html
http://www.google.co.nz/
http://www.smgrowers.com/products/
http://anniesannuals.com/sigsn/s/stipa
http://www.mostly.com/notes/
http://www.oardc.ohio-state.edu/seedid/family.

Branch members listening to Steve Burgess (ARC), as he pointed out places of interest from the lookout at Shakepear Regional Park, in February.

Field trip

By way of introduction to our field trip to Shakespeare Regional Park, Kevin Beals (ARC) outlined the very successful Partners for Parks Programme which operates in the Northern Regional Parks (Shakespear, Wenderholm, Mahurangi and Tawharanui). This involves

News from the Branches Northland/Auckland continued

the co-ordination of volunteers from a wide cross section of the Auckland public, who perform a number of tasks allowing rangers to accomplish much more than they would on their own. The valuable contribution volunteers make is recognised by way of personalised letters, small gifts, newsletters and an annual celebration. More information is available from the ARC website, www.arc.govt.nz under 'discovery programmes'.

Then it was off to the very scenic Shakespear Regional Park, to learn from Steve Burgess (ARC) about their mustelid trapping programme, which has been heavily reliant on the use of volunteers. The programme started after the public responded generously to a request for volunteer help following an article in the local newspaper. Monitored by a dedicated team of people, the programme has been successful in trapping stoats, weasels, hedgehogs and rats. Anecdotal evidence suggests that native bird numbers have increased in response to trapping.

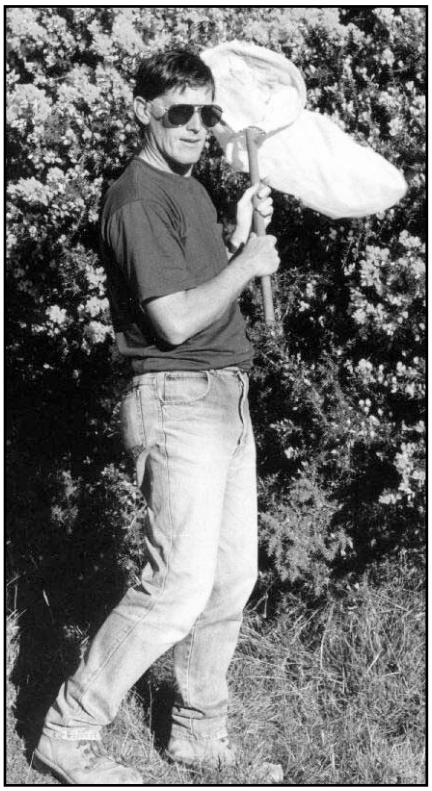
We then had the opportunity to see the park from a well-placed lookout, where we were able to see areas of native plantings that attract native birds from nearby Tiritiri Matangi Island. We concluded our trip by viewing some weeds around one of the older houses on the property.

Member profile: Hugh 'Huge' Gourlay

Hugh Gourlay, commonly known to his friends and colleagues as "Huge", works for Landcare Research at Lincoln where he helps to develop biological control programmes for weeds. Currently Huge is mainly involved with gorse, old man's beard, Californian thistle. and banana passionfruit. He is also a dab hand at mass producing releases of biological control agents and looking after the strictly controlled insect quarantine facility.

Huge's expertise is also in demand internationally, and he has spent a number of years testing the safety of gorse biological control agents for Australia and Hawai'i. Huge's job has also allowed him to travel extensively both within New Zealand and Australia, and in the UK, Europe, and parts of the USA. "The one good thing about working on weeds is that they grow everywhere," says Hugh.

Entomology has apparently been one of Huge's passions from the tender age of five. He is carrying on a family tradition, as his cousin, Ted Gourlay, was responsible for introducing the gorse seed weevil way back in the 1930s. Half a century later, Huge produced a printed colour chart outlining the life cycle of this little beastie, and helped to import, rear and release a second gorse seed feeder, the gorse pod moth.



"Huge" Gourlay caught in the act!

Another of Huge's passions, his childhood sweetheart Robyn, agreed to be his wife 20 years ago. They have two children (Nicola and Michael), who Huge regards, without bias, as "absolutely wonderful." Huge's other interests include fly-fishing, golf, soccer, going to the gym, and being on committees. He is a great organiser, and recently got stuck in to helping with the Canterbury Branch's highly successful METS.

Now Huge has his sights set on organising a week-long field trip around the North Island for people coming to this part of the world for the 11th International Symposium on Biological Control of Weeds in Canberra in April 2003. He is just the man for the job as he helped organise a similar field trip when the 8th Symposium was hosted at Lincoln back in 1992.

Huge has been involved in science research for most of his working life and has been based at Lincoln with the DSIR and subsequently Landcare Research for 20 years. Although he is now in his 40s, Huge claims to "not yet be too much the worse for wear" and is intending to carry on for a number of years yet. "Given that biological control is a very long-term strategy I hope to be able to see some of the fruits of my labour begin to pay off before I retire," says Hugh.

Summary of Australian community weed initiative study

By Wendy Baker
Plant Pest Officer
Environment Bay of Plenty

Acknowledgements

I would like to thank the three following organisations for kindly supporting me with my Australian Community Weed Initiative Study:

The Queen Elizabeth II Technicians Award Trust
Environment BOP
The New Zealand Biosecurity Institute

I feel very honoured to have undertaken this dream study trip and know that the experience and information I have gained will benefit my personal and professional life and also help other New Zealanders care for the environment wisely by raising their weed awareness.

It is also important to note that, as a dedicated Plant Pest Officer for Environment BOP, my study is relevant to our new Mission Statement which is:

Working with our communities for a better environment.

Thanks also to the 73 Australian weed and environmental professionals that I met and who kindly gave their time and made my trip very informative and interesting.

A list of these Australian professionals is included in my full report.

State-by-state summary

Western Australia

The main area which I felt was a significant initiative in Western Australia, and would be beneficial for New Zealand to develop further, was the amazing Community Volunteer involvement with weeds.

The enormous dedication of the volunteers was prominent throughout the many weed activities that I attended. I met with volunteers of three urban parks/ bushland in Perth — Bold Park, Kings Park and Shenton Bushland. The volunteers have established groups, which are called, for example, Friends of Bold Park. These 'friends' can be as active as they want to be and can participate in many activities such as weeding out exotic species, planting more natives, growing natives, guiding people through the park, weed displays/ newsletters, or just purely being able to enjoy the natural environent of the park. 'Bushcare' and 'friends' groups usually meet once or twice a month on a Sunday morning for a working bee.

In the more rural areas of Western Australia, many catchments have, and continue, to set up weed action groups. I met with Dr Stuart Wheeler who is the Department of Western Australian Agriculture's Senior Research and Development Officer who has set up 10 community weed action groups around WA in three years. He said that it was needed to "stimulate the community to take charge of weed problems and that the on-ground weed control was what the weed action groups were all about."

It was also pleasing to note that volunteer 'weedbusters' are provided with ongoing training, such as weed identification workshops presented by weed experts, and that they are rewarded for their weed control efforts also. While in WA, I met with community representatives from the Manjimup, Blackwood, and Vasse Weed action groups.

Plants that were targeted by some of these groups include: arum lily, Watsonia, bridal creeper and cotoneaster.

Australian community weed initiatives continued

Queensland

The main areas which I felt were significant initiatives in Queensland, and would be beneficial for New Zealand to develop were the successful Adult/Children Weed Awareness and WeedBusting Campaigns. Queensland first initiated Weed Awareness Week in 1994 and now it has become known as WeedBuster Week held annually in October throughout Australia. The state and territorial governments support WeedBuster Week and each state has a Weedbuster co-ordinator. Numerous organisations and community groups organise various weed-related activities ranging from library weed displays to reserve weeding days. I also met with the weed awareness mascot, Woody Weed who presents itself in every state during the weed awareness week. The theme for the 2001 WeedBuster Week was 'Local Heroes — Global Champions' in recognition of the Year of the Volunteer.

Wendy with 'Woody Weed', the weed awareness mascot in Queensland.

I attended three weedbusting activities in Brisbane accompanied by Department Of Natural Resources Project Officer for National Weed Awareness, Salvo Vitelli. These activities were held by local organisations — Greening Australia, Gold Coast City Council, and Logan City Council. Greening Australia had a public open day with commercial spraying equipment demonstrations, practical weed control exercises, weed identification displays and rewards of morning tea and weedbuster spot prizes for participants. Gold Coast City Council presented a wonderful weed display at a local shopping centre and were conducting a WeedBuster Competition/Survey to assess community interest in, and general knowledge of, weeds. Each participant in the survey received a small native plant.

Logan City Council had really got into the spirit of WeedBuster Week activities by organising both an information-packed weed display at their council office and running a local Primary School Environmental Weed Collection Competition called the Logan Environmental Olympics. The competition also involved local businesses as prize sponsors.

ACT Canberra

The main area which I felt was a significant initiative in Canberra, and would be beneficial for NZ weedbusters to develop further, was the Community Weed Initiative Projects.

Canberra has implemented a Bush Friendly Nursery Scheme whereby nurseries do not sell environental weeds as identified by the territory's government. These are weeds such as honeysuckle, broom, pyracantha and willow. The nurseries involved with the scheme have signs up telling customers they are "entering a friendly zone".

I met with ACT WeedBuster Co-ordinator Helen Peade who showed me two other community weed initiatives happening in urban Canberra. The first was the 'Adopt A Road' scheme in which local business' and community volunteers were involved in cleaning up a specific road by holding working bees several times a year.

The second initiative, and probably one of my favourites, was the Weed Swap run by volunteers from the Society For Growing Australian Plants, located at the dump or landfill centre. Residents were encouraged to bring in their woody weeds, like privet, and in return they would get a small native plant. I thought this was a great initiative because it was killing two birds with one stone by encouraging the public to take their weeds to the correct place — the dump — and they also were replacing the weed with a native plant. That's what I call a great way to enhance the environment and win the war against weeds!

New South Wales

The main area which I felt was a significant initiative in New South Wales, and would be beneficial for NZ to develop further, was the Specific Urban Weed Programmes and Weed Awareness Displays.

"Privet ban is good news" was the headline of a local newspaper article in the city of Orange NSW. Privet

Australian community weed initiatives continued

Weed swap in Australian Capital Territory (Canberra) in which people bringing their weeds to the dump were given a native Australian plant to take home.

is a weedy hayfever-associated pest in New Zealand and it was good to see that this Australian state has classified it as 'W4B regulated'. On speaking to Orange City Council's Noxious Weeds Officer, Roger Smith, I found out that this classification means that "it is legal to keep the plant but illegal to allow it to flower or fruit". As with Environment BOP, the Orange City Council have had incentive schemes in place to encourage people to remove privet from their properties such as free privet debris pick up.

As the Orange area is a farming community, I was lucky to attend The Australian National Field Days with the Department of NSW Agriculture Weeds Agronomist (HO), Bob Trounce. The field days saw the launch of the NSW WeedBuster Week by the Mayor Of Cabonne Shire Council, John Farr. I also saw a great WeedBuster display and was treated to an entertaining and educating environmental weed play featuring local botanical gardens workers and 'Woody Weed'.

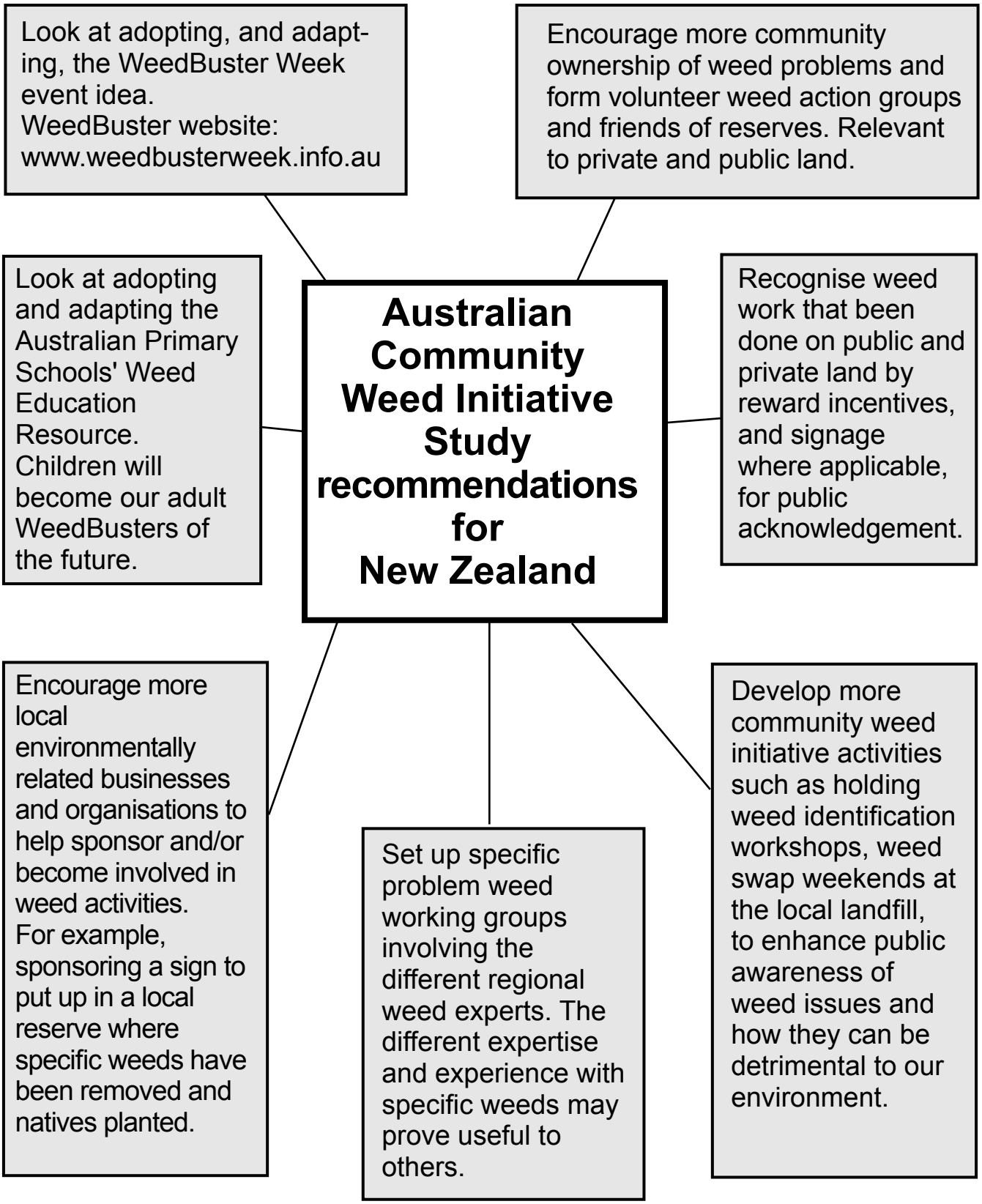
Victoria

The main area which I felt was a significant initiative in Victoria and would be beneficial for NZ to develop further, was the Weed Volunteer Recognition and Biological Control Weed Programmes.

Being International Year Of The Volunteer there was a strong commitment from the Department of Victoria Agriculture's Research and WeedBuster Officer, Kate McArthur, to ensure recognition was given to WeedBuster volunteers. Victoria's first, and definitely not last, Volunteer WeedBuster Award Ceremony was held with 40 entries received and certificates awarded. Another award was made to a private land holder who earned the Private Land Award for 'almost eradicating weeds from their land'. Kate said that "volunteer weed busters do it for the love of the environment" and that "WeedBusters bring people together". What a positive event WeedBusters was — lets hope NZ adopts it!

At the Keith Turnbull Research Institute in Melbourne I learnt about the biological (insect) agent for bone-seed, which is also an invasive coastal weed in NZ. The leaf roller moth, commonly called *Tortrix*, has been released onto bone-seed infestations in Victoria. The larva feed on bone-seed leaves, stems and bark which results in the death of terminal leaves and shoot tips. Where high densities of *Tortrix* occur the plant may be severely defoliated and weakened, or killed. As *Tortrix* is a relatively newly introduced biological control agent in Australia, the insect may take some time to establish and help contain the bone-seed population.

Australian community weed initiatives continued

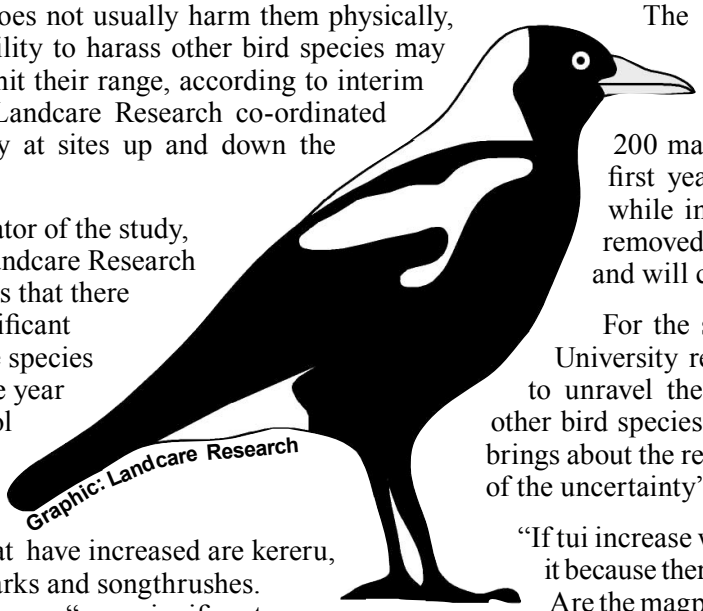


Australian community-based initiatives recommended for trial or adoption in New Zealand.

Effect of magpies on other birds subject of study

The impact stoats, rats, cats, ferrets and dogs have on native bird populations is well documented. It looks likely that that raucous trans-Tasman black-and-white arrival, the magpie, may well need adding to the list as well.

Although it does not usually harm them physically, the magpies' ability to harass other bird species may be enough to limit their range, according to interim results from a Landcare Research co-ordinated study under way at sites up and down the country.



The co-ordinator of the study, John Innes of Landcare Research in Hamilton, says that there has been "a significant increase in some species of birds after one year of magpie control — that's a scientific statement". The species that have increased are kereru, blackbirds, skylarks and songthrushes. There has also been a "near-significant increase in tui", which those involved in the study will continue to monitor.

"These are the species that landowners have noticed changes in, and are top of the list for the number of harassments that have been reported. . . . People now envisage harassment of birds moving between forest remnants is quite significant."

Innes says the study, which aims to look at the impacts of magpies on other birds, has two prongs — firstly to see what effect removing magpies has on other bird populations, and secondly researching the mechanisms of interaction between magpies and other bird species.

The first part is taking place at paired sites of several hundred hectares in Northland/Auckland, Waikato, Bay of Plenty, Waiarapa and Southland where bird counts of all species were carried out on all sites before control work began on one site out of each pair. Magpie control has involved killing the birds by applying what Innes describes as "maximum practicable control. . . . using the best current techniques applied thoroughly" by regional council staff.

The number of magpies removed from these 'kill blocks' surprised those involved — in areas where there was expected to be of the order of 200 magpies, up to 1500 were killed in the first year in the case of the Bay of Plenty while in Southland, 1000 of the birds were removed. Control and bird counts are ongoing and will continue for a further two years.

For the second prong of the study, Waikato University researcher Dai Morgan is attempting to unravel the interactions between magpies and other bird species to understand why magpie removal brings about the results is has so far — "to reduce some of the uncertainty" surrounding the mechanisms.

"If tui increase when magpies are controlled, why? Is it because there's more food due to less competition? Are the magpies killing tui, therefore their removal means there are more tui? Perhaps numbers of tui haven't changed at all but they have been keeping their heads low when magpies are around. With magpies removed the tui are more conspicuous. When we count tui we can't tell the difference between these situations."

Innes says that magpies are not the principle cause of native birds demise — mammalian predation accounts for the loss of 80% of nesting attempts. But rather when the native birds fledge and start moving across the rural landscape "they are exposed to this new thing — magpie harassment in addition to the other risks".

As part of his research, Dai Morgan is building a database of magpie harassment of other birds and is still interested in hearing from anyone who has witnessed it anywhere in New Zealand. It can be reported to him either by email: dm30@waikato.ac.nz or phone (07) 856-2889 ext 8123, or fax (07) 838-4324.

Practical Control Tips

Results from wild ginger trials

The only chemical used and recommended by the Welllington Regional Council for destroying wild ginger is Escort.

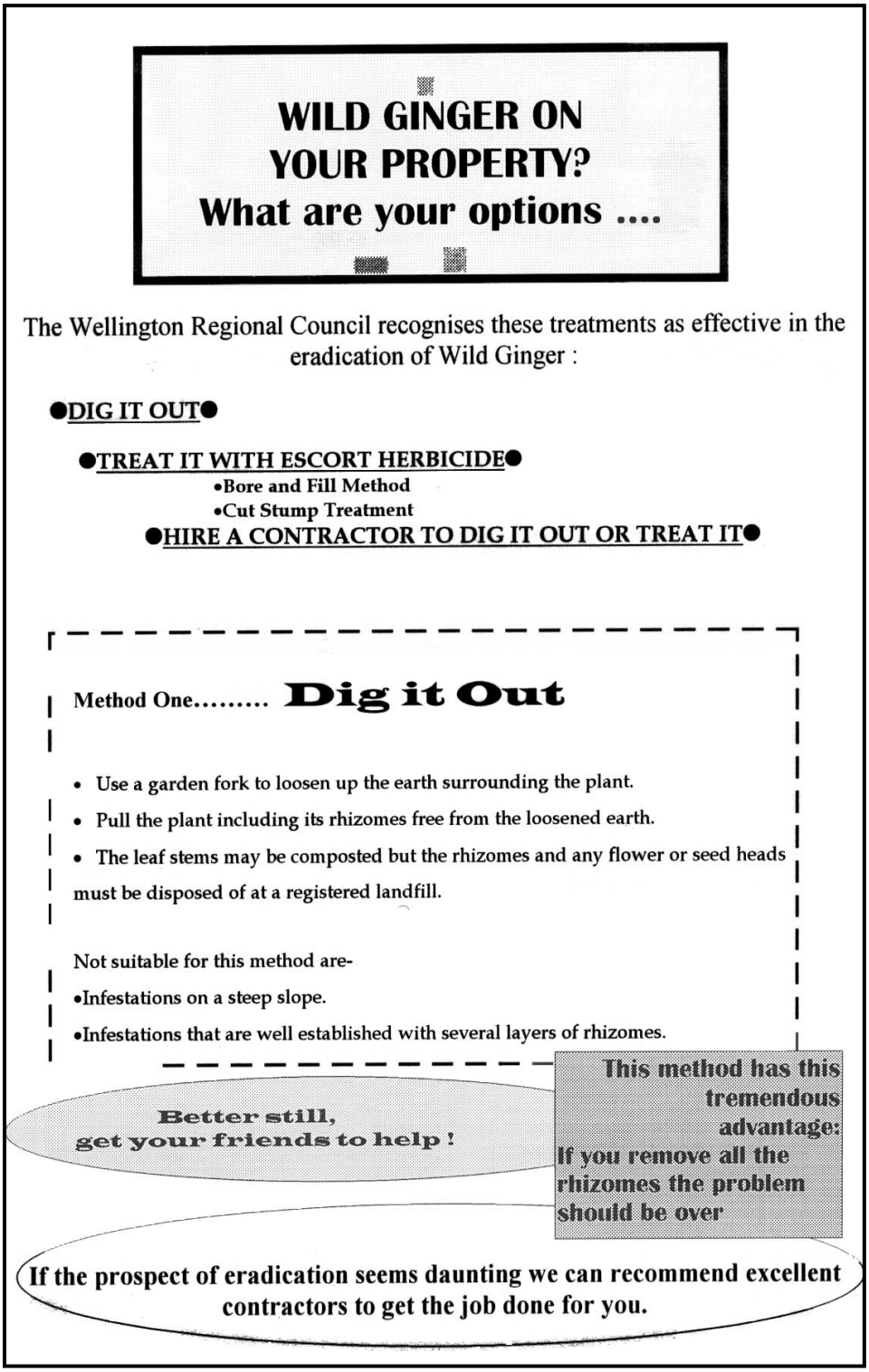
As Escort doesn't fix to the soil and can damage or kill desirable plants on private property, council workers have found it is best to drill holes in the ginger rhizomes and pour the chemical directly into the plant.

On waste land they are more likely to simply cut away some of the foliage, clear away any leaf-litter and spray directly onto the rhizomes.

Because on Escort's lack of binding with the soil they use these methods during settled weather to avoid the effect of rain water carrying the chemicals away.

They have renamed climbing asparagus to give it a name that describes the way it looks and to avoid confusion with any garden vegetable! Although a herbicide trial was set up for 'snakefeather' in the middle of last year it is still going and so they don't have final results yet.

However, spraying with Glyphosate seems to have the best knock-back effect. Tordon Brushkiller, Renovate and Escort stump treatments have reasonably good knock-back and also limit the emergence of seedlings.

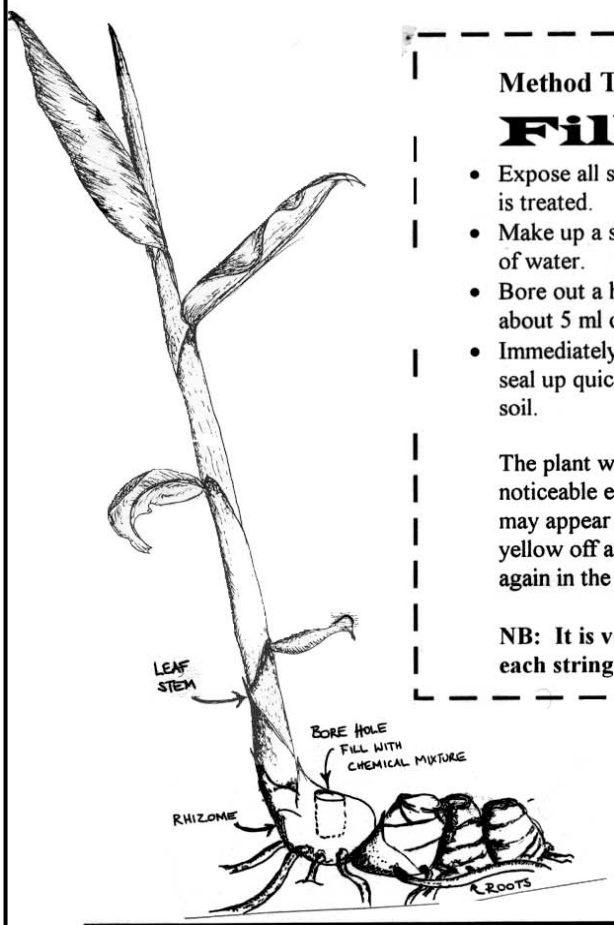


Wellington Regional Council's leaflet outlining methods for controlling wild ginger part 1 . . . .

Practical Control Tips: Wild ginger *continued*

Method Two.....Cut Stump Treatment

- Clear litter, covering soil and vegetation from around the clump of Wild Ginger so that you get good spray contact with the rhizomes. **(Escort can damage desirable plants).**
- Cut the leaf stems down to 200mm (8 inches) above the rhizomes.
- Spray the clump completely with Escort at the rate of one gram in two litres of water.
- Replace the cut leaf stems across the rhizomes.
- Do not apply Escort if rain is expected within 24 hours.



Method Three.....Bore and Fill

- Expose all strings of rhizomes. It is important that every string is treated.
- Make up a solution of Escort at the rate of 2.5grams in 1 litre of water.
- Bore out a hole in every third rhizome... enough to hold about 5 ml of Escort mixture (Use a knife or a 13mm drill)
- Immediately fill each hole with chemical solution....the holes seal up quickly. Take care to prevent spilling or leaching into soil.

The plant will take up to three months for there to be a noticeable effect and up to two years to disintegrate. Shoots may appear during this time but should; have black tips, yellow off and fall promptly. If they don't, treat the plant again in the areas that are showing growth.

NB: It is very important to make sure the last rhizome in each string is treated

IMPORTANT NOTES ON CHEMICAL ERADICATION

Escort is the only herbicide found to consistently destroy Wild Ginger in Wellington Regional Council trials.
Once mixed with water, the Escort must be applied within three days.
Shake the mixture well before applying.
Make up only the amount of chemical you need.
Escort is available at stock and station agents.
PLEASE READ MANUFACTURERS LABEL INSTRUCTIONS

And part 2 — more methods for wild ginger control.

Why screen for weediness?

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Calculated over time since European settlement, new plant species have been arriving in New Zealand at an average rate of 144 a year or one every two to three days. Of these some must be potential agricultural or environmental weeds. How to determine which are a risk or not given this country's unique ecology and dependence on agriculture is an area that needs careful analysis.

In less than 150 years, the size of the national flora of New Zealand has increased more than tenfold through the importation and establishment of alien plant species from around the globe. We currently have approximately 10% of the world's flowering plants growing here, on a land area comprising less than 0.2% of the world's total. The ratio of alien plants that have established in the wild relative to native plant species is greater than 1:1, one of the highest of any country or region on Earth. The rate of entry into New Zealand of alien plant species, based on the time since European settlement and the size of the alien flora (domestic and naturalised), has been approximately one species every two days, or 144 species per year. From this pool there are likely to be three to five potential new agricultural or environmental weeds per year, based on the proportion of species that have naturalised so far.

In total, these alien plants cost the country approximately $60m per year in indirect costs such as monitoring the border, implementing regional pest management strategies, and controlling weeds, and a further $40m in direct costs associated with loss of production, mainly of agricultural and forestry products. These figures do not include intangible costs such as loss of amenity in parks, or loss of biodiversity.

New Zealand native species are not totally benign either, for several have become major weeds in other parts of the world, ranging from flax (*Phormium tenax*) on the remote island of St Helena, to pohutukawa (*Metrosideros excelsa*) on the South African Cape, and karaka (*Corynocarpus laevigatus*) in Hawaii. Just recently, the South African authorities have become concerned about the introduction of New Zealand *Coprosma* species for horticulture. The trade in plants and the resulting spread of weeds is thus an international issue in which New Zealand is deeply involved. We have a responsibility for the preservation of our own indigenous biota and productive systems, and to the rest of the world, not to import or export species that may become weeds. The spread of alien plants is one aspect of global change where an individual can minimise her or his impact. For an individual traveller, this may simply mean not distributing seeds of invasive species, including the invasive species offered for sale in small packets at our airports. For those involved in the nursery trade, or with one of the numerous specialist plant societies, there needs to be a greater understanding of why plants became invasive, and the systems and protocols needed for importing and exporting plant species to effectively reduce the probability of new weeds.

There are many reasons why species become invasive in new countries. Alien plants are successful in New Zealand because many lack the natural predators and competitors that control population sizes in their regions of origin. For example, seed-eating insect larvae are rare on naturalised European *Asteraceae* in New Zealand, but common in their native habitats. Some alien plant species are better adapted than native species to elements of the New Zealand environment. Northern hemisphere conifers, such as *Pinus contorta*, tolerate cold better than native trees, and consequently grow well above the upper limit of beech and podocarp species, where they

Why screen for weediness? continued

threaten native shrubs and grassland. Many alien plant species are specialist disturbance tolerators, with large persistent seed-banks, rapid growth rates, and grazing-tolerant shoots, features that are rare in the native flora. They may also represent new functional types in the New Zealand environment such as the huge forest-invading herb, wild ginger (*Hedychium* spp.), or the nitrogen fixing Russell lupins (*Lupinus polyphyllus*) that smother river beds.

Apart from these sometimes esoteric explanations for why one species has spread, and not another, successful invasion may simply be a function of the extent of horticultural or forestry plantings. These create enormous propagule pressure, or seed rain, that facilitates their establishment in natural habitats. Such events are often random in time and space for individual species, and often reflect the vagaries of human activity as much as the ecology of individual plant species. This can lead to conclusions about site preferences and future invasion directions that may not be valid over the whole country. The abundance of firethorn (*Pyracantha angustifolia*) in the vicinity of Turangi in the North Island is not necessarily because this is the favourite habitat of the species in New Zealand, but because firethorn was intensively used locally as an amenity planting when the township was developed as a hydro town.

In many cases, invasions occur in habitats that have been weakened by humans, either directly through fragmentation and loss, or indirectly through the introduction of mammalian grazers. Time also can be a critical determinant of invasion success, for "if at first you don't succeed, try, try again". Most of the current naturalised alien flora is either established locally (c. 500 spp.) or is in the initial (c. 1500 spp.) or accelerated (c. 200 spp.) stage of spreading. Importantly, probably fewer than 50 alien plant species currently occupy anywhere near their full environmental range, and none would occur throughout at levels approaching maximum abundance. Overall, alien flora in New Zealand is at a very early stage of invasion, with most species having local distributions and small populations. In these circumstances, it is understandable that for most species, the impact of their populations has hardly been noticed. The impact of native weeds such as bracken, on productive systems, was obvious to the first settlers, but they could not foresee the effects of gorse (*Ulex europaeus*), brier (*Rosa rubiginosa*), hawthorn (*Crataegus monogyna*) or many other plants that quickly spread from early plantings. The impacts of such plants are clearly evident in production losses that contribute to the annual total of $40 m. Less obvious are the impacts of weeds on "non-productive" systems, of which we are slowly gaining a scientific understanding. Weeds can displace native species, but the major long-term threats are associated with modifications that induce changes at the ecosystem level. Weeds reduce the resources, such as light, available to other plants. Readily visible are smothering vines such as old man's beard (*Clematis vitalba*), which may kill an existing stand of vegetation. Less obvious are the effects of forest floor herbs such as wandering jew (*Tradescantia fluminensis*), which prevent the full complement of plant species regenerating on the forest floor, thereby permanently altering future forest composition. Weeds can literally alter the shape of the land, as in the case of marram grass (*Ammophila arenaria*) on fore-dunes, making the habitat unsuitable for native species. All ecosystems are dependent on disturbance for rejuvenation at some point, but weeds can change the frequency of such disturbances. Gorse, for example, has a higher fire frequency than original native vegetation, and as a consequence vegetation succession is repeatedly halted, as can be seen on many hills around the Wellington region. Biogeochemical cycles can be altered by, for example, alien nitrogen-fixing plants (all legumes), especially when they establish on surfaces otherwise virtually devoid of organic matter, such as sand dunes. Finally, there is a whole suite of plant and animal interactions where we often see quite unpredictable impacts. For example, important dispersal agents such as kereru (native pigeon) may develop a preference for fruits of introduced species in some environments, and reduce the dispersal chances for large-fruited native species such as tawa (*Beilschmieidia tawa*). An interesting example comes from Canberra, where there are widespread amenity plantings of colourful fruiting shrubs such as

Old man's beard (*Clematis vitalba*), top, is able to smother existing stands of vegetation, while wandering Jew (*Tradescantia fluminensis*) is capable of preventing some forest floor species from growing.

Photos: Auckland Regional Council

Why screen for weediness? continued

Cotoneaster spp. and *Pyracantha* spp. These provide additional over-wintering food for small native birds, as well as large currawongs (crows), which in turn prey on the nestlings of small birds to a greater extent.

Alien plants are not universally detrimental to the indigenous biota, and at least two types of benefit have been detected. Firstly, alien shrubs may facilitate succession to indigenous forest in previously deforested areas through rapid site occupancy and displacement of the dense ground-cover of herbs. In many environments, alien shrubs such as gorse and heather (*Calluna vulgaris*) can eventually be succeeded by native trees, at rates faster than would occur under seral native shrubs. Secondly, some elements of the native biota, notably some invertebrates and orchids, appear to thrive under alien shrubs and trees, respectively. Overall, however, the disadvantages of alien species escaping into the wild seem to far outweigh the advantages, and the introduction of species that may escape should be prevented. Knowledge of where they have come from in the past can help allocate resources to detect them.

Knowledge of the time of first detection in New Zealand, and country or region of origin of the naturalised flora, can help predict the source and pathway for the arrival of potential new weeds. Data recently analysed from seed material seized at the border indicate that most (70%) arrives as air baggage, and (25%) by mail, mostly from Australia, South-east Asia, and Europe. Approximately 35% of seizures made at the border are undeclared. Nursery stock, including cuttings and rooted plants, are less commonly intercepted, with Australia and the Pacific Islands being the most frequent source area. Overall, in the last 30 years, the proportion of imports of naturalised plant species arriving from east Asia and South America has increased, while the proportion from Europe has declined. These trends reflect historical reasons for plant introductions and the countries with whom we trade, growth of new commercial relations with other regions, and the ease with which material can be sent around the globe. An analysis of plant species submitted for importation before the HSNO Act (Hazardous Substances and New Organisms Act 1996), revealed the major drivers for new introductions. Private collectors and commercial nurseries comprised over 90% of the groups legally wanting to import new plant species. Agricultural interests, including horticulture and forestry, were less numerically significant. In contrast, the potential impact on the economy of a single new agricultural species may be many orders of magnitude greater than for a single horticultural importer introducing many non-commercial species, or for commercial urban horticulture.

There are several widely recognised protocols and principles that must be borne in mind when assessing the weediness of these proposed imports. In order to facilitate trade and comply with international trade conventions, the assessment method must be built on explicit assumptions and must use scientific data. Ideally, it should yield scores for individual species to enable comparisons and be decisive. This is to prevent plant species in what ever form (seeds, cut flowers, food) from being refused entry for spurious reasons. Since the impacts of many alien species are unpredictable, any intentional introductions should be based on the precautionary principle. In other words, unless there is a reasonable likelihood that an introduction will be harmless, it should he treated as likely to be harmful. Finally, the intentional introduction of an alien species should be permitted only if the positive effects outweigh the actual and potential adverse effects on the environment, and or, the economy. Note that this decision is a value judgement quite distinct from attempting to predict the weediness of a new species.

Several weed risk assessment systems (WRA) have evolved in recent years to assess the potential weediness of proposed plant imports. Originally they were based on the concept of the perfect weed, that is, a plant species that had all the characteristics present amongst invasive plants. This view has proved to be false, and weeds, like all plants, tend to be matched for particular environments. This means that different sets of attributes will be advantageous to an invading species in different environments. The potential environment/new species combinations are innumerable, and also unpredictable, and so too are the attributes that make a new species invasive. Furthermore, the habitats they might occupy, the native species they may interact with, and therefore their precise impacts, can be only generally assessed. The one attribute that has proved the most reliable indicator of weediness in a new country is the history of weediness elsewhere, in environments at least similar to the prospective new country. Of course, the strength of this correlation is improved if a species has had the opportunity to become invasive by being planted widely elsewhere. One of the cornerstones of WRA models, therefore, is that the intentional introduction of an alien species should not be permitted if its history elsewhere indicates the probable result will be a loss of economic or biodiversity values. This has been a key attribute in identifying weeds in proposed plant imports, and has been easy to assess when plant species have had a

Why screen for weediness? continued

lengthy residence in several other countries en route to New Zealand. Because New Zealand has a wide range of climates and soil conditions, it is most likely that any species from the subtropical or temperate region of the world that has shown weed potential is likely to become a weed here. However, circumstances are changing with the increase to many countries of direct access for trade and travel. As a result, for weeds of conservation areas, for example, an increasing proportion (currently 30%) have no weed history, having first been recorded as weeds in New Zealand. Thus, for many plant species that have come directly from Asia and South America, we have to predict weediness at the border de novo.

One problem inherent in the very attempt to predict weediness is that, in general terms, the chance of new species becoming a weed is low. In brief, this means that considering all plant species together, there is as much chance of getting it wrong as getting it right! The odds can be narrowed, however, by focusing the assessment on a plant species' immediate relatives. Because species' biological and ecological attributes tend to be clustered within families and genera, the weediness of a relative may give at least an indication of the invasive potential of an unknown species. New Zealand is one of the few countries in the world with databases of its entire flora, both cultivated and wild, including the important stage of naturalising, i.e. forming self-maintaining populations in the wild. An analysis of nursery catalogues indicating when a plant species was first offered for sale in New Zealand, and the time a species was first collected as an established population in the wild, gives an indication of the time between importation and establishment. The average period for bird-dispersed woody species, e.g., *Prunus* spp., *Rosa* spp., was about 50 years after introduction. Once a species has naturalised, anything is possible, and in time a great many will be perceived as having undesirable effects and will need to be controlled. From our databases we have calculated the chance of any new species naturalising, based on the history of its relatives to date. For many families, this is more than one chance in 10, e.g., *Salicaceae* (willows), *Solanaceae* (potato), *Asteraceae* (daisies). To place this figure in perspective, 10 percent from an insurance assessor's point of view would he considered "almost certain". In contrast, members of some other families have (so far) less than one chance in 100, of naturalising e.g., *Orchidaccae* (orchids) and *Bromeliaceae* (bromeliads). These figures give us an indication of the invasion probability, but other attributes apart from history and region of origin must also be taken into account.

Time taken for a species to become naturalised can be gauged by analysing nursery catalogues to ascertain when it was first offered for sale in New Zealand to when it was first collected in the wild as an established population. For a bird-dispersed woody species such as *Rosa* spp., above, naturalisation took about 50 years on average.

Photos: Auckland Regional Council

The manner of escape and spread of a little-known species new to New Zealand would be difficult to predict. However, it is important to estimate how readily the species could be detected and eradicated if it did escape and spread. Relatively cryptic species that are virtually indistinguishable from native species at a distance, would be very difficult to detect in the wild. In contrast, a species of the Australian grass tree (*Xanthorrhoea*) would be widely recognised as an alien species and therefore easily detected. Rapid growth to maturity, a high reproductive capacity, including reproduction by vegetative means, and specialised below-ground organs, generally indicates a species will be persistent and more difficult to control.

Despite all the difficulties outlined, weed risk assessments have to be made at the border on a regular basis. As well as providing useful aids for the detection of potentially invasive weed species, weed risk-assessment models are also important for prioritizing weeds for control, and the development of control strategies. Ideally, WRA models should also be interactive, to allow assessors to measure the influence of different attribute values on the final scores generated.

The WRA system developed for New Zealand, and currently used as part of border biosecurity, is based on a system originally constructed for Australia. The assessment sheet for each plant species being considered involves entering information on two major areas. Each question is given a score and the total score for weediness places a species in one of three classes: reject, accept, or requiring further evaluation. The biogeographical and historical information focuses on the characteristics of its native range, particularly climate, and its history of domestication, spread and weediness elsewhere. Factors such as a species origins and history, weediness of its relatives, and its own biological characteristics are all taken into consideration when assessing weed potential in New Zealand. The biological and ecological information uses attributes known to be associated with competitive ability, persistence, and reproductive vigour. In early tests, the WRA model clearly placed

Why screen for weediness? continued

all current major weed species in New Zealand in the reject/evaluate further category. Currently, much of our research is focused on improving the attribute information to detect weeds amongst species not yet in New Zealand, or weeds present only in cultivation/ low population densities. This involves comparative investigations of weedy/non-weedy species in several large families renowned for weed species (*Pinaceae*, *Fabaceae*, *Rosaceae*).

The potential weediness of a new species must then be weighed against the economic or environmental benefits, not just to the individual importer concerned, but to the country as a whole. This is the risk assessment, and risk management, component of the importation process, where much more than biogeography and botany are involved. Probability or chance, and its relationship to reward, is one way of looking at the issue. Imagine you are standing on the kerb of a busy street where one pedestrian in 100 has been knocked over attempting to cross the road. This is about the average chance for plant species selected at random to become a weed in New Zealand. Across the road there is $5000 and if you cross, you can have it. Would you cross? Now imagine the risk of being knocked over (becoming a weed) remains exactly the same, but the stakes are raised to $10m (a new export plant with the potential of kiwifruit). Maybe you would not run out straight away, but the difference is clear. This is the Environmental Risk Management Authorities (ERMA)'s job — to assess the risks and benefits, not just to the applicant, but to the nation as a whole, while preferably keeping our pedestrian alive (not allowing in new weeds). It is also very important that, in the case of a horticultural species of potentially high value, the assessment system does not make a false positive assessment (excluding a species when in fact it would not have become a weed) because there may be long-term economic consequences for the country. In contrast, there is less effect of a false positive assessment in the case of most horticultural species that individually may have little economic value. In aggregate, of course, the introduction of many new species for "urban horticulture" would make a significant contribution to the economy, as traditionally measured, if everybody rushed to buy them. At the moment, we have no system of putting a bond in place, just in case something goes wrong, as we would for someone wanting to open a new gold mine (which has economic benefit) and store toxic waste (which might damage the environment). One potential solution to this problem of not allowing in new high-value crop plants with some weed potential, is to have the species pay for their own control, should this be necessary. For example, just one cent deducted from every tray of export kiwifruit would be sufficient to control the invasive populations of this species in the Bay of Plenty. This would need to be spent on the very first outliers of the escaped populations. But then — managing incipient weed populations is a topic in itself, and perhaps the content of a future article.

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Alternatives to willows for riverbank protection: more weeds?

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Any search for plant species for river protection in New Zealand needs to look into all aspects of any alternative plant. It is counter productive to use a species to replace willows that could be a become a weed problem. Perhaps natives should be considered.

The outcome of a recent workshop to discuss alternative plant species for riverbank protection was the likelihood that weedy exotics will be developed for this purpose in preference to natives.

Willows (*Salix* spp.) are currently the only low-cost, effective tool for rapidly stabilising riverbanks of high-energy, gravel rivers. They are also widely used for stabilising banks for less erosive river systems throughout New Zealand. However, some willow plantings are now at risk from the arrival of the willow sawfly (*Nematus oligospilus*) in New Zealand, which is causing serious damage to plantings in some regions, notably Hawke's Bay and Bay of Plenty. There is also a growing realisation of the long-term risk from pests and pathogens in using a single genus (often a single clone) for riverbank plantings.

The workshop, Riverbank Protection Plantings: Mixing Willows with Alternative Species, was organised by the Willow and Poplar Collective through HortResearch and the Wellington Regional Council. The aims were to discuss the risk posed by the sawfly and current research developing sawfly resistant willows (HortResearch), and to develop recommendations for advancing evaluations of alternative species. The workshop was attended primarily by regional council river engineers and soil conservators, but also by HortResearch, Landcare Research, Forest Research, DOC and the Wellington Botanical Society.

There was consensus among river engineers that there is currently no proven species that is as effective as willows for front line river protection, although there are alternatives for lower energy rivers where funding allows 'hard' river protection works (concrete/gravel constructions). The river engineers also agreed, however, that willows can create problems in smaller, lower energy rivers by blocking channels and reducing flood capacity. Many participants were dismayed to discover that not only is a DOC-funded feasibility study for the biocontrol of willows (particularly crack, *S. fragilis* and grey, *S. cinerea*) under way in New Zealand, but that a similar feasibility study in Australia has resulted in the initiation of a biocontrol programme for willow with a view to using pathogens as biocontrol agents. Any release of pathogens (rusts, smuts, etc.) in Australia is likely to result in air-borne dispersal across the Tasman to New Zealand.

River engineers from many regional councils still use crack willow in ways that exacerbate its spread, eg., layering and trenching. It is the weedy characteristics of willows that make them so useful and cost effective (in the short term) for stabilizing banks, and it is these characteristics river engineers seek in alternative exotic species (Table 1): prolific seeding, suckering or coppicing and rapid growth. Recent research has shown that the best predictor of weediness is 'effort in planting' — those species that are most widely planted are more likely to become invasive. Exotic species being

River protection alternatives Continued

Species	Countries in which these species are invaders
Acacia dealbata Silver wattle	South Africa[1,2], Canada, USA, New Zealand
Acacia melanoxylon Tasmanian blackwood	South Africa[2], Canada, USA[4], New Zealand
Alnus cordata Italian alder	New Zealand (D. Stephens, DOC Waikato Conservancy)
Alnus glutinosa Black alder	Canada, New Zealand, Australia, South Africa
Alnus incana Grey alder	
Alnus rubra Red alder	New Zealand (D. Stephens, DOC Waikato Conservancy)
Casuarina cunninghamiana River she-oak	South Africa[2], USA[4]
Casuarina glauca Swamp she-oak	USA[4], New Zealand
Chaemaecytisus palmensis Tree Lucerne	Australia, New Zealand
Elaeagnus angustifolia Russian olive	USA[4]
Platanus acerifolia London plane	NOTE: *Platanus occidentalis* (sycamore) is highly invasive in New Zealand
Platanus orientalis Oriental plane	
Populus euramericana Veronese, Crowsnest, Fraser, Selwyn	
Populus hybrids Tasman, Otahoua, Weraiti, Toa, Kawa	
Populus alba X *glandulosa* Yeogi 1	NOTE: *Populus nigra* and *Populus alba* are invaders in USA, Canada, South Africa, New Zealand
Salix spp. Shrub willows (not *S. cinerea*)	Australia
Tamarix chinensis Tamarisk	USA[4], Australia, Canada, South Africa[1,3]
Ulmus pumila Siberian elm	USA

Table 1. Recommended list of alternative exotic species for riverbank protection. This list was circulated among all Regional Councils to encourage trial plantings of these species. Search for invasiveness was conducted for South Africa, Australia, New Zealand, USA and Canada. The invasiveness of some species is unknown. However, there is a high probability of invasiveness where another species in the genus is invasive.

1) Declared Weed Invader in South Africa: Prohibited plants. Must be controlled, or eradicated where possible (except in biocontrol reserves, which are areas designated for the breeding of biocontrol agents).

2) Declared Invader Plant in South Africa: Mainly commercial plantation spp. but also plants for woodlots, animal fodder, soil stabilisation, etc. Allowed only in demarcated areas under controlled conditions and in biocontrol reserves. Prohibited within 30 m of the 1:50 year floodline of watercourses or wetlands, or as directed by the executive officer.

3) Declared Invader Plant in South Africa: Mainly ornamental spp. No further planting allowed (except with special permission) No trade in propagative material. Existing plants may remain but must be prevented from spreading. Prohibited within 30 m of the 1:50 year floodline of watercourses or wetlands, or as directed by the executive officer.

4) Noxious weed in USA.

River protection alternatives Continued

promoted as viable alternatives include *Acacia dealbata* and *A. melanoxylon*, both of which are serious weeds in South Africa where they are current targets in biological control programmes. These acacias are also currently being targeted for control by DOC because of their increasing invasiveness in New Zealand.

The use of native species as alternatives for riverbank protection was discussed at the workshop. However, lack of information about the root systems of native species, and the perception that natives are expensive, have slow growth rates and require high initial maintenance, are likely to restrict the use of natives in the front line of river protection. Field trials quantifying growth rates, coppicing ability and root structure of native species alongside willows is necessary to convince river engineers to use natives in riparian areas. Trials could also aim to decrease establishment costs and develop planting and maintenance guidelines specific to these riparian zones. Willows inter-planted with native species (nurse plant strategy) may offer rapid bank stabilisation while reducing weed impacts and enhancing biodiversity values when willows are removed in the medium term.

Greater interaction between regional council biosecurity staff and river managers may help raise awareness of the invasiveness of particular species used in riverbank protection plantings. River engineers and managers should be encouraged to trial native species rather than exotic weedy species. The species currently being promoted as alternative species pose a serious threat to the biodiversity of riparian and wetland areas. Although initial planting and establishment costs of willows and other exotics may be low, long-term maintenance costs can be high (willows must be maintained or they can cause erosion and flooding) and do not include the costs of removing willows/exotics from streams and wetlands where their impact is most severe.

Survey shows pest size does matter

A Landcare Research report on public attitudes to introduced pests clearly shows that the larger the size of the pest, the less the public tends to object to it. This finding has important implications for agencies working to control pest species.

The report, *Introduced Wildlife in New Zealand — A Survey of General Public Views*, is the first comprehensive report of its kind in the country. It shows a strong public dislike of small pests like rodents, rabbits and possums, while everything above the size of a goat tends to be viewed as both a resource and a pest at the same time.

Landcare Research animal ecologist Dr Wayne Fraser said that just under 860 people from across the country responded to the survey. Wasps and rodents were viewed as pests by up to 95% of them, and feral cats and possums by up to 85%. However, about 15% saw possums as a resource, as well as a pest. About three quarters of respondents saw rabbits, hares, stoats, ferrets and weasels as pests, while the remainder largely regarded them as both a pest and a resource.

In contrast, only about 40% of respondents saw wallabies purely as pests that should be controlled, and less than one third saw feral goats, pigs and horses this way. Only about 10% saw thar and chamois purely as pests, and just 5% for deer, with more than 80% wanting them managed as a hunting resource.

Rodents and wasps had the dubious honour of being the pest that people would least enjoy seeing in the wild (just 5% would enjoy meeting a rodent). In contrast, nine out of 10 respondents said they would enjoy seeing deer in the wild, and eight out of 10 would enjoy seeing feral horses.

"Some of the larger animals had a higher popularity rating than native species like bats and weta," Dr Fraser said.

He said more than 80% of respondents felt that not enough was being done to manage or control the impacts of introduced pests. But when asked to allocate a nominal $100 wild animal control tax between species, the amounts allocated to rabbits, possums and wasps alone made up two thirds. The relatively small amounts allocated for deer, thar and feral goat control further highlighted the lower priority attached by the public to controlling some larger introduced species.

Knowledge is power

Dr Fraser said the survey results provided agencies such as DOC and local authorities with proof that many people have a favourable view of pests that is quite at odds with New Zealand legislation.

"All our introduced wild mammals are legally pests, except hares, through a legal oversight. Agencies have a legal and ecological obligation to control them, but this is made more difficult by the favourable view that many people have of some pest species.

"Under the Resource Management Act, agencies must make provisions for public consultation in some areas, such as pest management and pesticide application. The results of this survey give those agencies a scientific basis to develop and improve how they formulate new policies and target public education on pests."

Dr Fraser said it was not entirely surprising that people have positive feelings about pests like deer. "One factor which may influence public perceptions is that larger species such as deer and goats which are pests in the wild are also farmed.

"However, much of the high public approval of larger pests can be explained by childhood conditioning. Most people prefer 'cuddly' animals to 'scary' insects and bats, which appear in horror stories.

"Thankfully, despite the cute bunny rabbit songs and stories we grew up with, most people do not have the same positive view on rabbits. This is largely due to the good job that government agencies and the media have done on educating the public about the damage that rabbits cause."

Dr Fraser said the influence of childhood conditioning highlighted the need for changes to the school curriculum. "The curriculum needs to better reflect New Zealand's unique predicament.

"The New Zealand environment had no land-dwelling mammals before humans arrived, with the exception of three species of bats. Consequently, our native plants and animals evolved without having to cope with a wide

Pest size does matter Continued

range of mammals, including herbivores and predators. Many of our native species are quite defenceless against them".

Among other significant results from the survey:

- A pragmatic approach to pest control: 95% of respondents would prefer that some commercial gains be made from pest destruction (e.g. from venison recovery or possum fur).
- Large majority of respondents wanted pests to be destroyed humanely
- Very little difference between urban and rural people in attitudes towards introduced wildlife. This is in sharp contrast with similar surveys overseas, e.g. in North America, where urban people feel far more protective of wildlife, even including introduced species.
- The similarity of urban and rural views recorded in this survey could indicate New Zealanders' greater access to and familiarity with the natural environment, in comparison with people in other developed nations. Three quarters of the survey respondents had visited a forest or national park in the last five years.
- When people were asked about what pest control techniques they prefered, they tended to choose the historical status quo e.g. shooting for deer and other large animals, and poisoning for rabbits, possums and other small animals. However, the use of poisons and biological controls meets with considerably less approval from women than from men.

Source: Landcare Research

Warm year could give bio-invaders a lucky break

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Many insects and plants that represent biosecurity risks to New Zealand are limited in their potential spread by our temperate climate. Future climate change could open New Zealand's door to those species, and vigilance may need to be increased during abnormally warm years.

Climate change increases suitable mosquito habitat

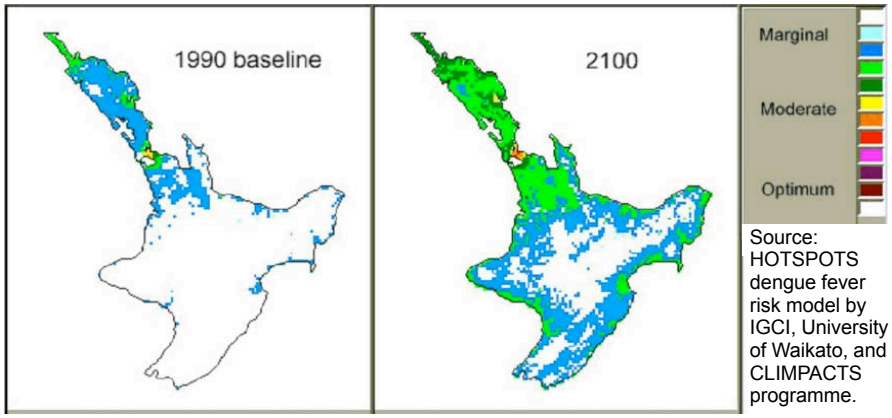
Most mosquito species capable of transmitting infectious diseases, such as Ross River virus disease and dengue fever, need warm and humid conditions to thrive. The southern saltmarsh mosquito (*Ochlerotatus camptorhynchus*) (*Biosecurity* 31:6) is a notable exception. Other species from that family of mosquitoes are more effective in transmitting these diseases, but risk of their establishing in New Zealand is currently limited by our cool climate conditions.

Projections of climate change, caused by emissions of greenhouse gases, show that average temperatures in New Zealand could rise by up to several degrees within the next 100 years. This would significantly increase the area where exotic mosquitoes such as *Aedes albopictus* and *Aedes aegypti* could establish.

Collaborative research between the International Global Change Institute at the University of Waikato, the CLIMPACTS programme and the Wellington School of Medicine has made significant progress in understanding the influence of climate change on the potential risks posed by these mosquitoes.

A new model, 'HOTSPOTS', allows assessment of changes in climate suitability. The model maps potential points of introduction (harbours, airports) and incorporates demographic factors that could influence actual occurrence of dengue fever. Uncertainty around climate change can be accommodated by using various scenarios and assumptions.

HOTSPOTS could help to direct future control and eradication efforts, but also highlight areas where preventative health programmes may be needed to prevent outbreaks of the disease.



Source: HOTSPOTS dengue fever risk model by IGCI, University of Waikato, and CLIMPACTS programme.

Establishment risk (climatic suitability and risk of introduction) for dengue vector *aedes albopictus*, for 1990 and 2100. The model assumes continued growth in greenhouse gas emissions and use projections from a global climate model.

Climate variability and application to other species

The current model describes changes occurring over decades and longer, but it can also assist short-term management decisions. Abnormally hot years (such as the 1997/98 El Niño year) can result in short-term temperature increases, similar to the long-term changes expected several decades from now under climate change.

For many species, a single warm year will probably not be enough, but for some plants and insects it may just be the lucky break they need to become established in New Zealand. Our knowledge about the climatic requirements of many other exotic species is still very limited, and expansion of modelling capabilities is planned. Climate change and variability adds another dimension to the complex task of maintaining New Zealand's biosecurity.

CLIMPACTS programme: www.waikato.ac.nz/igci/climpacts_webpage

Climate change health risks and diseasevector modelling: www.climatechange.govt.nz/sp/resourceinformation/pdf/Climate Change-Health.pdf

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Ballast water database assists marine biosecurity

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Ships' ballast water is a major threat to New Zealand's marine biosecurity. The threat is managed by exchanging ballast water on the high seas en route to New Zealand, or by using freshwater ballast. Information collected by the Ministry of Fisheries (MFish) is being used to build risk profiles for New Zealand's ports of arrival and for the key ports overseas from which ships trade to New Zealand.

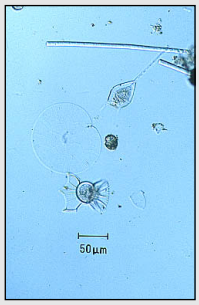
The ballast water database includes vessel details, where vessels have come from, whether they have undertaken ballast water exchange, the quantities of ballast water discharged, and when vessels were last dry-docked and cleaned (hull fouling is another significant risk to marine biosecurity (*Biosecurity* 30:6).

Risk profiles for NZ

MFish is implementing a surveillance regime to help detect the arrival of exotic marine species. Surveillance will be concentrated at ports and marinas with the highest risk of incursion. Since it is not known which factors contribute most to the level of risk, risk profiles have been developed for points of entry to New Zealand. Sampling will initially

Dinoflagellates **(type of plankton) sampled from the ballast tank of a bulk carrier vessel en route to New Zealand.**

Photo: Cawthron Institute



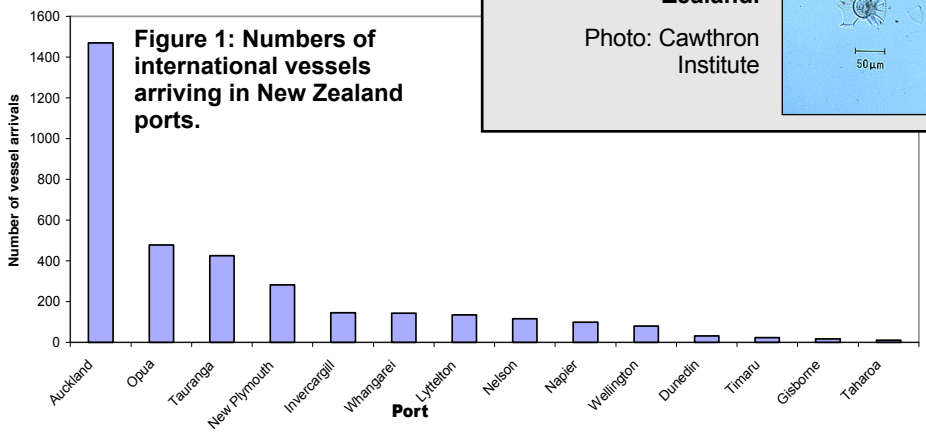


Figure 1: Numbers of international vessels arriving in New Zealand ports.

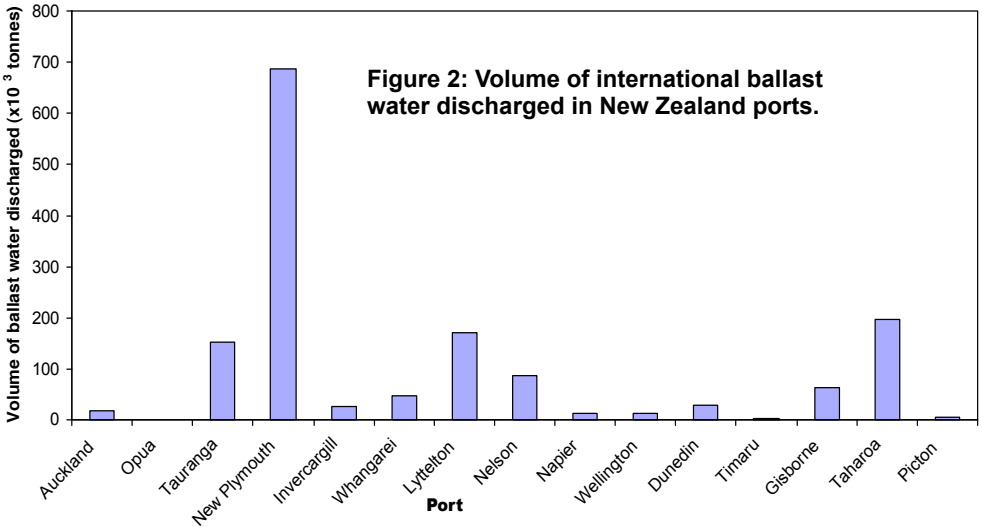


Figure 2: Volume of international ballast water discharged in New Zealand ports.

Notes to Figures 1 and 2: New Zealand port risk profiles
The number of vessel arrivals does not necessarily reflect the volume of ballast water discharged and vice versa. For example, Port of Auckland has a low volume of ballast discharge but by far the highest number of vessel arrivals. Data for ballast water is from January to September 1999. Data on vessel arrivals was provided by MAF and is for July 1999 to June 2000. The numbers of arrivals for Opua and Whangarei are preliminary estimates based on information from the ballast water database in the early 1990s.

Ballast water database Continued

include each of the following port risk profiles to help determine which characteristics are good predictors of incursion risk:

- High number of vessels, high number of source countries and low ballast discharge (e.g. Auckland — a net importer of goods)
- Moderate number of vessels, small number of source countries and low ballast discharge (e.g. Opua — landfall for most international yachts which do not carry ballast) from Pacific islands)
- Large number of source countries and high ballast discharge (e.g. New Plymouth — oil tankers arrive fully laden with ballast, discharge, and load crude oil).
- Small number of vessels, small number of source countries and moderate volume of ballast discharge (e.g. Taharoa — an offshore terminal only for ships loading iron sand for Japan).

Risk profiles for overseas ports

The ballast water database also contains information on trading patterns that can help determine from which regions, countries and ports New Zealand receives vessels and ballast water.

Important source ports will be assessed to determine if marine species of particular concern are found there, and whether the local environmental conditions are similar to those in New Zealand. MFish can then determine whether certain species are likely to arrive in New Zealand and establish successfully.

The shipping industry co-operates with MFish in the collection of ballast water reports, and data on vessel arrivals is provided by MAF.

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