LECG

Think piece on the future of pest management in New Zealand
Main report

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3 October 2008

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Executive Summary

The ideal pest management outcomes and systems in 10-15 years time will not necessarily differ from today, in terms of their aspirations and characteristics. However the changes in the challenges and opportunities over this period will alter how the ideal can be achieved.

"*Tiakina Aotearoa Protect New Zealand: The Biosecurity Strategy for New Zealand*" (2003) (the Biosecurity Strategy) was aspirational, and the ideals it asks the pest management community to strive for remain relevant today and into the future.

In the Biosecurity Strategy, pest management was contextualised as part of the spectrum of biosecurity activities, along with prevention and exclusion, and surveillance and response. The goal the Strategy set for pest management was:

> *"effective management (including eradication, containment and control) of established pests and unwanted organisms capable of causing harm to the economy, environment and people's health."*

The Biosecurity Strategy called for a number of changes to be made to pest management arrangements, including the clarifying of roles and responsibilities.

New Zealand's pest management system stacks up well compared to other states and provides a strong base to work from

In the years since the Biosecurity Strategy was released, there has been considerable institutional change within the sector. New co-operative working arrangements between central government agencies, and with Regional Councils and industry, have been introduced. In the absence of regulatory requirements for action, partnership and good will have been the basis of achieving a "joined up" pest management sector.

MAF has been largely responsible for helping to lead the introduction of these new initiatives, but has been dependent upon the support and co-operation of all actors within the system.

Compared to many overseas jurisdictions, New Zealand's pest management system is well advanced. This is illustrated by the case studies on parts of the United States and Australia included as an appendix to this report. New Zealand's approach to pest management recognises it is part of the overall biosecurity spectrum, and that pest management is a tool to achieving a range of outcomes. There is unanimous appreciation of the importance of pest management to protecting indigenous biodiversity, as well as economic and human health outcomes.

There are some problems in the existing pest management system, and some challenges ahead

Despite being relatively advanced compared to other jurisdictions, there has been no conscious design of the pest management system since the biosecurity framework began to undergo significant institutional change in the 1980s. There is a need now to take forward the expectations set in the Biosecurity Strategy and to position the sector to face oncoming challenges.

Key challenges, likely to characterise the sector over the next few years, include:

- An increasing pest management burden. Experts spoken to forecast an increase in the pest management burden. The increase will come both from new pests becoming established in New Zealand and through the re-emergence of a number of legacy pests that for a range of reasons have generally been well managed in the last 10-15 years. For example, the re-emergence of rabbit problems, with possible resistance to rabbit calicivirus, and greater numbers of possums as the Animal Health Board stops possum control in some areas or becomes increasingly targeted in its approach.
- A diminishment in the ability to utilise the full range of physical controls for pest management. The New Zealand public is increasingly urbanised and opposed to the use of chemicals in the environment. A vocal group are concerned about use of GM and bio controls. These social trends influence the regulatory environment for the introduction and use of chemicals in pest management. Simultaneously, trends in international chemical development mean sprays are becoming increasingly specific and may struggle to find a sizeable enough market in New Zealand to justify their introduction on commercial grounds.

The four key problems within the pest management system, which will affect the system's ability to respond to these challenges, were found to be:

- Roles and responsibilities are not sufficiently clear to allow the system to function effectively.
- existing policy does not sufficiently encourage collective action or address the impact of a land manager's pest management decisions on their neighbours;
- Legislative tools available to central and local government to undertake pest management under the Biosecurity Act 1993 are rigid and may not be fit for purpose.
- The tool box of physical controls for pest management is not sufficient to allow effective management of pests.

New policy initiatives and legislative change is required to fully address the range of problems and future challenges

There are a range of policy initiatives that could be introduced within the existing legislative framework to help improve the effectiveness of the pest management system. However, legislative change will be required to address the fundamental issues related to roles and responsibilities and the availability of appropriate regulatory tools for Regional Councils and central government.

Pest management is fundamentally about risk management. Efficient management of risk requires that those with the best information, capability and incentives to manage the risk do so. Consequently, in thinking about policy for pest management it is important to keep coming back to the information and capability of parties to manage a risk, and consider how to place the correct incentives on them to manage that risk efficiently.

Opportunities for improvement within the existing legislation

Opportunities for improvement to the pest management system within the existing legislation include:

- Encouraging and enabling more collective action amongst landowners.
- Providing greater seed capital for pest management activities related to biodiversity outcomes.
- Having a single manager of the pest management tool box responsible for ensuring the physical control tools remain available to support effective pest management.
- Using social marketing to increase understanding of pests and how the public contributes to their spread or management, and to induce behaviour change.
- Improving the response to findings from the pest surveillance system.
- Reviewing approaches to spending and contracting by central government agencies to avoid crowding out of spending by others and to improve capability.

We see these as the short term opportunities to improve the effectiveness of pest management activity, and would encourage MAF to pick each up as the subject of a full policy development process. The suggestion of a single toolbox manager is more difficult, and careful consultation and analysis of the best way in which to achieve the concept's intent will be required.

Opportunities for improvement requiring legislative change

We see prescription of roles and responsibilities within legislation as necessary to address the pest management system's need for clarity on this issue. However, in order to support this, and prevent all costs landing on government, the role of land owners and potential exacerbators should also be considered. Land owners and potential exacerbators have considerable ability to affect pest spread, and need to be incentivised to help manage that risk. Opportunities for improvement of legislation include:

- Prescribing roles and responsibilities for central government and regional council in legislation.
- Using a property right to place some responsibility for pest management on potential exacerbators and those land owners who risk creating costs to others (introducing a principle of freedom from pests of others).
- Altering Regional and National pest management strategies to provide central government and Regional Councils with more flexible tools that reflect their elected status and existing powers.

Pest management is just one part of the biosecurity spectrum – if roles are to be defined and prescribed in the legislation for this part of the spectrum, it is probably necessary to a "joined up" approach that the role of Regional Councils in other parts of the spectrum also be considered.

Summary of suggested roles and responsibilities if all policy suggestions were introduced

Following is our suggested table of roles and responsibilities.

Description of suggested roles and responsibilities	
Organisation / actor	**Key roles and responsibilities**
DOC and other Crown land managers	No change from current role prior to review of tools for long term containment of wild animals and fresh water fish,[1] other than: • Support MAF as toolbox manager. • Operate within the national pest management regulatory framework and as Crown land manager subject to national regulations related to pests, consistent with the principle of freedom from pests spread by others.
MAF	Responsible for pest management to support outcomes where nationally important (complementary to the responsibilities of DOC)

[1] The Biosecurity Strategy called for the review of tools for long term containment of wild animals and freshwater fish. Until this review is completed, it is assumed DOC should take a leadership role in these areas mirroring that of MAF in other pest management.

Description of suggested roles and responsibilities	
	System oversight, including • Managing the pest management tool box. • Managing the national pest management regulatory system, including supporting Regional Councils in implementation and enforcement of the regulatory system. • Coordinating the pest & weed surveillance system. • Undertaking performance monitoring of system & intervention effectiveness. Implement interventions to encourage collective action by landowners and other groups to manage pests. Identify and lead programmes to target pest pathways of national interest. Work with all other organisations to maximise effectiveness of delivery systems.
Regional councils	Undertake pest management within their regions in order to achieve outcomes of regional importance. Operate within the national pest management regulatory framework; including being consistent with any requirements introduced through central government pest management strategies for outcomes of national importance. Implement and undertake enforcement of the national pest management regulatory framework within their region. Support MAF in programmes to encourage collective action to manage pests and address pest pathways. Provide advice, and if necessary referral to MAF, on the best way to manage pests. Utilise the toolbox consistent with MAF management and advice.
Landowners and potential exacerbators	Take reasonable steps to manage pests on their property so that they do not spread to another person's property. Comply with all regulatory requirements.

MAF's leadership role

Under the Biosecurity Strategy MAF has been charged with providing leadership on pest management. Leadership is a highly subjective term and expectations of how MAF should demonstrate leadership varied amongst those we spoke to.

To us, key characteristics of a leader include being able to think strategically, communicating that strategy, and bringing out the best in others. We suggest that MAF should focus on exhibiting these characteristics in the way it approaches its responsibilities. MAF's ability to offer leadership will also be enhanced through clearer roles and responsibilities and specific regulatory tools for central government, through which it can influence the sector. However, the regulatory stick should be used sparingly, and we would hope that - as one interviewee described it – goodwill will remain the cement of the sector.

Where to from here

The ideas set out in this think piece have been developed within the context of the Biosecurity Strategy 2003, which called for the clarification of roles and responsibilities within pest management.

The challenge is how to take forward that thinking and put in place clear roles and responsibilities, while also addressing a number of associated challenges.

This think piece puts forward one set of options. Other people will have suggestions on other ways of achieving similar outcomes.

We suggest that MAF begin a process of engaging with key stakeholders to gauge reaction to the proposals included here and see what other solutions are put forward.

However, the process and extent of debate should be appropriate to the size of the issue. We are primarily taking forward existing policy recommendations within one part of the biosecurity spectrum.

1 Introduction

John Hellstrom and LECG were commissioned by the Ministry of Agriculture and Forestry (MAF) to produce an independent think piece on the future of pest management in New Zealand. The think piece's primary purpose is to inform development of a national strategy that will guide pest management activity in New Zealand.

1.1 Context for the think piece

Significant changes have occurred over the last two decades in the way that the New Zealand biosecurity system is organised. These changes began with the major structural reforms of the public sector in the 1980s, which led to the formation of new departments, including the Department of Conservation (DOC) in 1987, and the Environmental Risk Management Agency (ERMA) in 1996. The Biosecurity Strategy 2003 was a trigger for further change in how responsibilities for biosecurity are co-ordinated between central government agencies.

While these changes have collectively shaped the frameworks that enable pest management, there has been no "conscious design" from a pest management perspective to ensure that the resulting system enables effective pest management. This think piece is a first step in a discussion about how well the system is currently working, the challenges that are likely to face the sector in the future, and some options for improvement.

We were reminded by one of our interviewees that a think piece should be provocative and initiate debate. While our focus has been on undertaking quality analysis and offering some pragmatic opportunities for improving the effectiveness of the sector, we have been open to significant change to the pest management system and part five of the Biosecurity Act 1993 (the Act). While some change to the Act is warranted, this change is not wholesale. It is primarily about tweaking and evolution.

1.2 Acknowledgements

While John Hellstrom and LECG have "held the pen" on this analysis, the findings and ideas are reflective of the input received from many experts on pest management who have contributed to the work.

The project was overseen by a Steering Group chaired by Andrew Harrison, Manager of the Pest Management Group of MAF. Andrew was also the project sponsor, and we are grateful to him for his support and guidance. Andrew has made significant comment on the findings of the work throughout the project. The other Steering Group members were Basil Chamberlain (Taranaki Regional Council), Peter Thomson, Chris Baddeley, Douglas Birnie (MAF), and Kevin O'Connor (DOC).

A Reference Group was also convened, with whom we were given the opportunity to test our ideas and the findings from the interview process. The Reference Group consisted of Stephen Goldson, Mick Clout, Terry Smith, Neil Walters, Wren Green, Bill Bayfield, and Mike Taylor. We would also like to thank SJ Owen and Carol West for their considerable feedback.

1.3 Definitions

What is a pest?

Definitions of pests vary:

- The Biosecurity Act 1993 defines a pest as any organism that is part of a national or regional pest management strategy.
- A pest could be defined as an Unwanted Organism.
- MAF considers an organism to be a pest if it has a negative impact on outcomes related to outcomes related to human health, the environment or the economy.
- Research commissioned by MAF into the views of non-experts found that a "pest" is a highly personal term – what is a pest to one person may well be valued by other people.

For the purposes of thinking about pests in this report, we do not think that a single definition is required. However, we do use the term in a lay sense, rather than with any specific or technical meaning. In general, the project team has come to favour a values based definition, noting that fundamentally a pest can be thought of as an organism that is negatively impacting on what is important to humans – whether through one of the outcomes described by MAF or for another reason.

Use of the term "Land"

Through out the analysis we refer to "land" in a very general sense. Where the term land is used we intend this to refer to all environments, including marine and fresh water. The terms terrestrial, marine and freshwater are used where we wish to distinguish one environment from another.

2 Methodology

In commissioning this think piece, MAF specified aspects of the analytical approach that would be taken to the analysis. We have sought to follow these specifications, and supplemented these with additional research and approaches as helpful.

The project was effectively broken into three parts:

- An evaluation of the current state of pest management and development of a problem definition;
- Consideration of the future challenges and opportunities for pest management, and research to identify approaches used in other jurisdictions; and
- Identification of options to address the problems.

The range of approaches to analysis are listed below.

- *Public policy and economic analysis* from first principles to understand the rationale for government involvement in pest management and what it is the government is seeking to address through intervening.
- *Institutional analysis* looking at government direction, legislation, institutions and incentives within the pest management sector, to identify gaps or issues in the framework.
- *Case studies*, which provide real life examples of how the current system is working and how pest management operates in other jurisdictions.
- *Interviewing of thought leaders* in pest management – a series of individual and group interviews were undertaken with those involved in pest management in a range of ways. In addition, a number of individuals provided information and ideas through informal discussions.
- *Workshops* were held with the Reference Group and later with the combined Reference and Steering Groups to test ideas and receive feedback.
- *Targeted literature reviews* were used to find material related to approaches to determining appropriate spending levels and clarifying the roles of actors within the sector.

Information supporting this report is contained in a separate volume: *Background analysis and interview findings*.

2.1 Scope

For the purposes of this think piece, MAF restricted the scope of pest management to "controlling pests that are already known to be present in New Zealand, preventing their spread within New Zealand, and protecting valued sites from pest damage".

Reflecting other work that is ongoing or recently completed, further exclusions were:

- Pest management communication activities.
- Review of the role and direction of science to underpin pest management (noting this was recently traversed in the Biosecurity Science Strategy).
- The future of incursion response (i.e. response to pests that are new to New Zealand) border or pre-border biosecurity.
- Formal review of progress to date against the Biosecurity Strategy for New Zealand (2003).
- Developing a national strategy or strategies for the pest management area.

Specific inclusions, as set out in the request for proposal, were:

- Pest management in marine, freshwater and terrestrial environments to achieve the full range of biosecurity outcomes (as per the current biosecurity outcomes framework).
- Pest management across private and publicly-owned land.
- The pest management activities of all central government, regional government, industry and NGO's.
- Transition from response to long term management.
- Surveillance to support pest management activities.
- Highlighting any new issues for consideration and/or recommending any changes to current pest management directions or expectations in the Biosecurity Strategy for New Zealand.

The definition of pest used by MAF is an animal (vertebrate or invertebrate), plant or disease (e.g. virus, fungus, bacteria) which adversely affects animal, plant and human health or the environment.

3 Pest management system

This background section outlines the key organisations involved in pest management and the rationale for government involvement. A separate document *Background analysis and interview findings* contains more detailed institutional and economic analysis.

3.1 Future challenges and opportunities

This section summarises comments from interviewees, the Reference Group and LECG on the future challenges and opportunities for pest management over the next 10 to 15 years.

3.1.1 Drivers of challenges and opportunities

The challenges for pest management change and develop over time.

Looking back

Looking back, the main drivers of the current arrangement for pest management have been a mix of changes in our economic base, in societal expectations and in our institutional arrangements. In the past, pest management was almost entirely about the destruction of agricultural pests. However, over time, matters of the environment and a broader understanding of sustainability have meant that matters of biodiversity are now of equal importance. There has been a steep rise in community groups involved in biodiversity (e.g. Landcare Trust) and a growing presence of Maori involvement in the debates during the 1980s and 1990s, despite issues around capability, capacity, funding and urbanisation.

There is growing sensitivity to the tool box used for pest management. An example of this was the psychological and political impacts of Auckland spraying programs – which put biosecurity in the media. The regulatory regime has become tougher with ERMA and the Resource Management Act 1991 (RMA) restricting utilisation of the tool box. Regulatory change is matched with a public nervousness around biotoxins, pesticides and genetic modification.

Local government has tended to be at the forefront of pest management efforts. However, the local government sector has gone through substantial change and reform. There has been a proportional erosion of staff in councils working on pest management (approx 22% down to 4% in one example)[2], although total staff numbers involved in

[2] This example was provided as an anecdote by one of the Reference Group members. No figures have been collected to verify this anecdote, or to establish whether overall resourcing for pest management proportional to other activities has changed. A decline in total resourcing for

pest management have increased. Councils have not received extra funding for land management. There is a general feeling that goodwill between organisations has taken pest management a long way, but is not enough to take us forward and meet the substantive challenges ahead.

MAF work and marketing (e.g. airport notices, social marketing, fines, Biosecurity Strategy) has influenced thinking about the overall biosecurity system, as has the separate establishment of MAF Biosecurity New Zealand (MAFBNZ).

Looking foward

Looking forward, the drivers of future arrangements need to reflect a range of issues, including those listed below.

- Tourism, trade and immigration driving exposure and possible attitude changes.
  Increasing rates of tourism, trade and immigration mean that New Zealand will be exposed to more pests, but will need to keep exports pest free in order to retain trade linkages and the environment relatively pest free to protect tourism. As New Zealand moves to a new population mix, new immigrants may have different values about what level of pest management and approaches to pest management are acceptable.
- International changes raising international pressure
  New Zealand will be required to meet changing international requirements, for example, the World Trade Organisation's Agreement on Sanitary and Phytosanitary Measures, which restricts the ability to consider consumer benefit when making trade decisions. New Zealand will face increasing international pressures to shift to sustainable pest management. These pressures will also come through international lobbying groups such as the Animal Life Organised Protection (ALOP).
- Legislative changes driving exposure
  Changes to New Zealand legislation will also affect the level of biosecurity risk and ability to respond. For example, the Walking Access Bill, if passed, will lead to greater biosecurity risk as trampers move more freely between different valleys and river systems with potentially contaminated boots and equipment.
- Societal pressure strengthening
  The expectations of society on pest management and appropriate responses are changing. For instance, an increasingly urban society will seek changes to the types of pests that are dealt with, and may have reduced understanding about pest management in rural environments. There appears to be an increasing value placed by society on the environment and native species, which in part is driving the landcare movement and volunteerism. Some socio-economic groups will seek

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pest management activities proportional to other regional council activities was suggested by several interviewees.

more organic produce, and this is often associated with increasing social concern about the use of all chemicals in the environment. Treaty settlements have strengthened the ability of Maori to engage, which will increase pressure from iwi. Societal pressure may stem from the economic values under threat if sufficient pest management does not occur, but also from wider cultural and other values. Ethical issues, such as the use of GMO, will continue to pose a challenge.

- Changes in land intensification
  Increasing intensification of land and aquatic use patterns and primary production will put more pressure on ecosystems and may lead to greater pest management risks. Changes in land use in different regions is also occurring (e.g. introduction of viticulture into the lower South Island).

- Climate change effects unknown, but likely
  The impacts of climate change are not yet known, but it is expected that pests may spread more quickly and move north to south. Some interviewees and Reference Group members suggested climate change policy would have more of an impact on pest management than climate change itself.

- Types of pests will change, and sleeper pests will emerge
  New pests will emerge, such as more invertebrates, reptiles and new diseases. Marine pests will take a greater focus. Sleeper pests will start multiplying.

- Approaches to pest management to keep matters in balance
  Improvements in understanding of pest management will lead to new approaches in pest management and more integrated pest management, particularly if we draw on international research and maintain capability in the sector. The balance of species vs site based management will change.

- Science will make the tool-kit more effective
  Developments in science will continue to drive changes to pest management. Interviewees spoke of the development of a range of new tools that would potentially benefit pest management, including GMOs, and use of new and targeted chemicals. New developments in science were also seen as having the potential to help better manage existing pests, as well as new pests.

3.2 Opportunities to respond more effectively

In this section we outline the opportunities that interviewees believe will be presented over the next 10 to 15 years to respond more effectively to the pest management burden.

Some of the opportunities identified are listed below.

- Work together in a more coordinated collaborative way
  The key opportunity presented is for government agencies, councils, community groups, land care movements and private landowners to work together in a more coordinated, collaborative way to plan activity and manage pests more effectively. Interviewees expressed a desire for more collaborative, communal, partnership

based approaches (as opposed to command and control, although some also saw these types of measures as having a place), which leverage off existing groups, and ensure that the roles and approaches of each organisation are clear. Opportunities include:

- Developing local coalitions of interested groups.
- Integrating border and post-border activities.
- Greater industry involvement.
- Linking work under the science and biosecurity strategies.
- Sharing learning with overseas agencies.
- Supporting and coordinating community involvement.
- Building a better understanding of how each organisation operates, which will facilitate the achievement of joint objectives.
- Using a Co-operative Research Centre type model (an Australian institute for research into management of invasive species, control tools, and good practice for use of controls).

- Keep doing high quality research, share information more effectively and use research results

  Related to working together collaboratively, interviewees noted that there were opportunities to continue to produce high quality research, share information more effectively, communicate better with the public and support uptake of research. Science is a key platform underpinning pest management, and the science community needs support to continue this work. Information sharing is crucial in pest management. It includes a number of components:

  - Technical side, e.g. accessing databases, linking into decision support systems, seeing the results of a surveillance strategy.
  - Sharing information between organisations.
  - Sharing information with the public, to help improve understanding of the role of pest management and pest management agencies.
  - Promoting the integration of learnings and uptake of research.

- Use new pest management tools

  Interviewees involved in undertaking pest management were optimistic that there would be leaps forward in technology which will lead to new responses to pests and alternatives to pesticides and the use of toxins. Interviewees predict a greater use of advancements such as genetic technology, as well as more traditional approaches, such as Matauranga Maori bioprotection. Given the small size of New Zealand's market for these tools, this may generally involve selecting and adapting tools made for other markets to the New Zealand environment (or developing tools in New Zealand that also have wider applicability). Interviewees suggested that new tools

may be able to help better manage existing pests, as well as address new pests – helping to manage what was otherwise seen as an increasing pest management burden.

- Use policy and economic tools
  Getting the pest management strategy right is a key opportunity. A pest management strategy, along with the science and biosecurity strategies are seen as opportunities to improve coordination and focus in the pest management area. Economic tools also provide an opportunity to incentivise landowners and industry groups to deal with problems, and the use of multi-criteria analysis provides a tool to prioritise activity.

- Work more effectively with Maori
  The next 10 to 15 years will bring a greater opportunity to involve Maori more heavily in pest management decision-making, possibly devolving some decision-making to Maori. Maori are consulted on many things, – so it will be important to tap into expertise at the right level and in the right place, and to be clear on what is to be achieved from consultation. Attitudes and views amongst Maori are not generic, and care needs to be taken to ensure consultation does not assume this. For instance, in our own interviews with persons who identified as Maori or represented Maori organisations, significant differences in attitudes to the introduction of new pest management technology were demonstrated.

- Use internal borders and protect sanctuaries
  Internal borders present an opportunity to deal with pests in an effective way, utilising lessons from island management, including mainland island management. Borders will need to be used to continue protecting sanctuaries, such as the Chatham's and other offshore islands.

- Utilise social science more effectively
  Pest management was characterised as being "80% social and 20% technical", suggesting that there is a significant under-investment in determining society's views on pests and pest management/control and then utilising this information to achieve improved pest management outcomes. Societal views on what is a pest, what constitutes acceptable pest control tools and how personal behaviours spread pests need to be considered in effective pest management. The level of societal concern about pests will also largely determine central and regional government's investment in pest control.

Changing our thinking about how borders are defined
The Reference Group raised the issue of how borders are defined, for example, as national, regional, sub regional, or site borders. The definition of a border was considered important as internal borders could be a useful tool to help manage pests (e.g. as raised in the Biodiversity Strategy). Specifically there is an opportunity to use the North/South Island division better, as well as sea gaps, mountain ranges etc. While this approach should be utilised, creating such borders would also lead to increased expectations amongst the public about ability to manage pests within regions, and these expectations would need to be managed as failures will occur.

3.3 Challenges

Key challenges for pest management in the next 10 to 15 years are outlined below.

- Be prepared to respond to an increased total pest burden
  The key challenge is to be able to respond to an increased total pest management burden – which will include dealing with legacy pests, existing pests, sleeper pests, and new pests in land and aquatic environments. The sector is expected to have to respond to major incursions and new types of pests which will test resources, the ability to prioritise activity and the pest management toolkit. Some interviewees perceived Didymo as an example of lack of preparedness for the unexpected.
- Funding and prioritisation of pest management
  Interviewees see funding levels and/or funding principles as a challenge which needs to be dealt with to achieve the goals of the Biosecurity Strategy and fund ongoing research in a sustainable way etc. There is an opportunity to link funding to those who exacerbate or benefit, and spend money upfront on prevention and early intervention. The significance of pest management in regional council expenditure will continue to decrease. In other areas of local government responsibility there are often minimum requirements the council must meet (e.g. RMA), but these do not exist for pest management.
- Retain capability and improve understanding about species and pests
  Two related challenges concerned a number of interviewees. Firstly, retaining capability in the pest management space, in science, physical pest control and at the policy level (although some interviewees indicated the ability to access capable persons was manageable if funding was available). And secondly, using this capability to improve our understanding of both existing and potential new pests. Advances in modelling techniques can be used to help build this understanding, as well as information sharing, and new research. The reduction in the numbers of contractors used to undertake pest management was seen as a risk to the practical, on-ground knowledge amongst people involved in undertaking pest management.
- Maintain access to pest management tools
  Interviewees expressed concern that the current tool box of physical control tools is

becoming smaller, as utilisation of tools such as pesticides and other spray or chemical measures becomes increasingly unpalatable. Inappropriate use of one tool by an organisation could reduce the ability of all others to access that tool later on. Rising costs, due to high regulation and the cost of inputs such as fuel for helicopter spraying may also put limits on the use of some tools. Chemical controls are likely to become increasingly targeted to particular organisms. While this is generally a positive, the relatively small New Zealand market and the regulatory requirements in place under the Hazardous Substances and New Organisms Act 1996 (HSNO) for the introduction of new chemicals may affect their cost effectiveness. Some interviewees cited the need for the development of tools and pest management techniques that were suitable for use by volunteer groups with limited pest management skills (e.g. in handling chemicals) and would give them a sense of "reward" (e.g. seeing a dead possum). The tools needed to be supplied for volunteer groups – which offer large quantities of relatively unskilled labour – would be likely to differ from the tools needed by other organisations in the sector, looking for less labour intensive options.

- Measure progress over the long term
  A challenge for organisations involved in pest management is to measure progress and manage performance over the long term, checking whether objectives are correct and ensuring that they are met.

Hornwort – an opportunity taken

Hornwort *Ceratophyllum demersum,* is a highly invasive freshwater weed. According to NIWA[3], it is currently considered New Zealand's worst submerged weed. The first South Island detection of Hornwort was in 2002 in the Motueka River, and later in ponds in the surrounding district. DOC lead the response, with technical assistance from NIWA and the strong support of LINZ and the Tasman District Council,[4] and the incursion was eliminated by 2004.

In February 2006, an incursion was detected in Timaru[5] and eradication attempted by MAFBNZ. The preferred herbicide for the conditions required both consent for use through Resource Management Act processes and an additional permission for use from ERMA (obtaining of which had been a condition of ERMA registration). Registration was finally funded by a coalition, including beneficiaries such as Meridian Energy[6]. Treatments applied in March 2008 appear to have been successful in achieving elimination.[7]

The effective management of these incursions illustrate a number of issues relevant to successful pest management in New Zealand.

- Some surveillance activity was in place and assisted the detection of hornwort.
- A single agency took lead responsibility for responding to each incursion and where relevant coordinated the contributions from other agencies.
- The Motueka response was supported by a Technical Advisory Group and involved all key stakeholders including Iwi.
- There was adequate funding to support the programme.

However, there were also some problems which could have led to failure.

- Some members of the public were not particularly supportive of the programme because it restricted their access to waterways under herbicide controls.

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[3] http://www.niwa.cri.nz/pubs/wa/ma/13-3/hornwort

[4] LINZ 2003-2004 Annual report *Unalienated crown land weed control Tasman-Nelson district* Financial Year 2003-2004

5 http://www.biosecurity.govt.nz/files/pests/hornwort/hornwort-delimitation.pdf

[6] Paul Champion *pers comm*

[7] http://www.stuff.co.nz/print/4500579a6571.html Timaru Herald April 29, 2008

- There was a continuing risk of further spread while the programme was being implemented. This was partly due to regulatory delays.
- Access to preferred treatments can be slow or non-existent if there are weak incentives for these products to be fully approved for use in New Zealand.

From the Hornwort case study included in *Background analysis and interview findings*

3.4 Organisations involved in pest management

Pest management is one part of New Zealand's biosecurity framework. "*Tiakina Aotearoa Protect New Zealand: The Biosecurity Strategy for New Zealand"* (2003) (the Biosecurity Strategy) sets a vision for New Zealand's biosecurity system that "New Zealanders, our unique natural resources, our plants and animals are all kept safe and secure from damaging pests and diseases".[8]

Key priorities identified in the Biosecurity Strategy included clarified roles and responsibilities, improved coordination between and within the different levels of government, and improved prioritisation and decision-making.[9] Recommendations included that a single agency (MAF) be made accountable for ensuring the full range of biosecurity activities are delivered effectively and efficiently. Previously, responsibility for leadership and co-ordination of pest management was unclear.

The Department of Conservation (DOC), Ministry of Health (MoH), Ministry of Fisheries (MFish) and Ministry for the Environment (MfE) also have accountabilities for, or interests in, pest management.[10] While not legislatively required to undertake pest management, Regional Councils have put in place regional pest management strategies in their regions.

The following table sets out key organisations involved in pest management, describes their current roles and other key information.

[8] P8, Tiakina Aotearoa Protect New Zealand; The Biosecurity Strategy for New Zealand, August 2003.

[9] *"Tiakina Aotearoa: Protect New Zealand. A Summary of the Government's response to the Biosecurity Council's biosecurity strategy for New Zealand."* August 2003.

[10] DOC, MoH and MFish are signatories to a memorandum of understanding with MAF regarding how central government biosecurity responsibilities will be co-ordinated.

Key organisations involved in pest management	
Ministry of Agriculture and Forestry (MAF)	Under the Biosecurity Strategy 2003, MAF is responsible for providing national leadership and co-ordination for all biosecurity activities. MAF has no legislative responsibility to manage pests. MAF is responsible for administering the Biosecurity Act 1993, Part V of which specifically relates to pest management. MAF has enforcement responsibilities associated with HSNO. In 2008/09 approximately $36m of Vote Biosecurity was allocated to pest management, with approximately $31m going towards the National Pest Management Strategy for Bovine TB.
Regional Councils (RCs)	RCs do not have any legislative responsibility to undertake pest management. However, all RCs have put in place Regional Pest Management Strategies and have some biodiversity responsibilities under the RMA.
Environmental Risk Management Authority (ERMA)	ERMA is the body set up to regulate the use of hazardous substances and new organisms, as mandated by the HSNO. The HSNO provides the framework for the entry of new organisms and substances to New Zealand – including reducing the risk that new pests establish and regulating access to some pest management control tools (e.g. bio control, genetic modification (GM) and pesticides).
Department of Conservation (DOC)	DOC manages Crown Land that is part of the conservation estate, and undertakes pest management to protect that land and threatened species. DOC has a legislative responsibility to advocate for the conservation of natural and historic resources generally. DOC is responsible for administering the following legislation with relevance to pest management: • Conservation Act 1987. • Wild life Act 1953. • Wild Animals Control Act 1977. • National Parks Act 1980. • Reserves Act 1977. • Marine Reserves Act 1971. In 2006/07 DOC estimates that it spent approximately $74m on pest management and $2m on meeting the Crown's obligations as a "good neighbour" by undertaking work consistent with RC's RPMS. DOC administers several Crown funds which make grants to support biodiversity protection on private and Maori land (including for pest and weed control). These funds include Nga Whenua Rahui and the Biodiversity Condition and Advice Fund.
Land Information New Zealand (LINZ) and other	Responsible for managing unalienated Crown land and undertaking pest management on this land as provided for by central government.

Key organisations involved in pest management	
Crown land managers	$2.4m is included in Vote Lands for pest management in 2008/09
Ministry of Health (MoH) and Ministry of Fisheries (MFish)	Both MoH and MFish have interests in pest management and provide advice to MAF on how pest issues related to health and fisheries should be addressed. MoH is accountable for managing nuisance pests under the Health Act and for advising MAF and other agencies about the use of treatments such as pesticides.
Ministry for the Environment (MfE)	MfE is the central government's primary advisor on the environment and international matters that affect the environment. Key areas of interest include management of natural resources, biodiversity, and sustainability. MfE is responsible for administering a range of legislation, including the RMA and the HSNO. The RMA is significant for pest management for a range of reasons, including as resource management plans made under the Act may affect the utilisation of some control tools.
National Pest Management Strategy (NPMS) management agencies	Management agencies are put in place to manage NPMS programmes. The most prominent management agency is the Animal Health Board, which is responsible for the management of the Bovine Tuberculosis NPMS. In 2006/07 the AHB had a total budget of $78.4m.
Crown Research Institutes (CRIs) and other science research bodies	Undertake research and surveillance to support pest management on a contract basis. Organisations may also receive funding through Foundation for Research Science and Technology to undertake research related to pest management. The Ministry of Research Science and Technology estimates that approximately $37m is spent on biosecurity science annually.[11]
Public groups with interest in pest management	Examples are Landcare groups, which represent the public interest in pest management and other land care activities, weedbusters, and trusts which manage private mainland islands.
Private land owners	Undertake pest management activities consistent with their own interests and as required by National and Regional Pest Management Strategies The agricultural sector was estimated to have spent $318m on inputs to pest and weed management in the year ended March 2005.[12]

[11] *A Biosecurity Science Strategy for New Zealand*, October 2007.

[12] Statistics New Zealand

Possum control – an end to a collaborative approach?

For the past 15 years New Zealand has mounted a widespread programme to control possums throughout the country, the primary driver for which is the Bovine Tb National Pest Management Strategy, managed by the Animal Health Board (AHB).

For many years there has been a degree of collaboration between the AHB, DOC and Regional Councils to both maximise the achievement of shared goals in Tb control and biodiversity protection. But the resulting tripartite arrangements have come under increasing pressure as the AHB focuses on increasingly restricted possum populations as it seeks to conclude the Tb scheme. At the same time, biodiversity protection has also become more targeted. The extent and value of the overlap between the objectives of the agencies has diminished.

Marlborough is an example of where the tripartite approach to managing possums is no longer in place. The Marlborough District Council (MDC) and DOC still collaborate on possum control for biodiversity reasons. The AHB has withdrawn from contracting through the District Council.

Changes in the working arrangement risk reducing the sharing of best practice between agencies. And as the AHB possum control effort becomes more targeted, or ends in some regions, the coincidental biodiversity benefits significantly decline**.**

4 The economic rationale for government intervention in the market for pest management

The core economic rationale for considering whether a government intervention in a market is warranted is the identification of a market failure.

Market failure occurs where a market, on its own, will not allocate goods and services in a manner that is economically efficient. Effectively, it is situation where the level of activity that is desirable for society as a whole will differ from the level of activity that would be undertaken by rational individuals acting on their own.

government intervention in response to a market failure will not necessarily result in a better outcome for society.

In pest management, the primary cause of market failure stems from a series of externality problems – situations where the actions of an individual will impose a cost or benefit upon another individual. For example, if a land owner does not manage a pest on their property, the pest may spread onto the neighbour's land. Correspondingly, if they do manage a pest, the neighbour will potentially benefit from this.

In making decisions, the land owner is likely to only consider the costs and benefits that they experience.

4.1.1 Sources of market failure

There are three key sources of possible market failure related to pest management.

Firstly, pest management occurs to support a range of outcomes and there is likely to be underinvestment in achieving these outcomes. Outcomes pest management supports include protection of health, indigenous biodiversity, economic production and cultural values. In the case of each of these outcomes – or the ecosystems being protected to generate these outcomes – there are benefits that will not be able to be captured by the individual land owner. For example, the "existence benefit" from knowledge that a particular ecosystem is protected will be enjoyed by all, but the cost will not necessarily be shared by all. This will lead the landowner to under-invest in achieving these outcomes.

Secondly, the externalities associated with pest management activity mean that individual land owners are unlikely to capture the full range of costs and benefits from the activity. Our analysis suggests that, in general, pest management generates positive externalities, and therefore the individual will undertake less pest management activity than is socially desirable.

Thirdly, because of the nature of pest management activities as a good, pest management lends itself to being undertaken through collective action by neighbouring

land owners. Agreeing to work together carries with it a range of information, policing and enforcement costs that may make collective action relatively difficult. "Free rider" situations may also occur, where one land owner opts out of the collective action as they will be able to enjoy the benefits regardless of whether they help meet the costs of action.

Another rationale for government involvement in pest management may be provided by the precautionary principle, which *"requires public decision-makers to take scientific uncertainty seriously in the pursuit of the regulatory goals of environmental and public health protection*".[13] The principle may provide a rationale for government action in situations where not taking action may lead to irreversible harm.

[13] Fisher, Elizabeth, and Harding, Ronnie, *The Precautionary Principle and Administrative Constitutionalism: The Development of Frameworks for Applying the Precautionary Principle,* University of Oxford Faculty of Law Legal Studies Research Paper Series, Working Paper No 31/2006, June 2006.

5 Problem definition

The problem definition sets out the key issues in the sector which we believe will need to be addressed to improve the pest management system's functioning.

The problem definition was arrived at through a process of background research, including economic, public policy and institutional analysis, interviewing, case studies and a workshop with the project Reference Group. The information that supports these problems is summarised here but set out in more detail in a separate document, *Background analysis and interview findings.*

The Steering Group prioritised the problems in the following order:

- Roles and responsibilities are not sufficiently clear to allow the system to function effectively.
- Existing policy does not sufficiently encourage collective action or address the impact of a land manager's pest management decisions on their neighbours.
- Legislative tools available to central and local government to undertake pest management under the Biosecurity Act 1993 are rigid and may not be fit for purpose.
- The tool box of physical controls for pest management is not sufficient to allow effective management of pests.

Other problems identified, but considered of secondary importance, are that:

- There appears to be a disjuncture between the pest management expert view, and the public view, regarding what is a pest and the size of the emerging pest management problem in New Zealand.
- Central government agency spending approaches do not encourage additional investment by other organisations or individuals.
- Delays in acting on surveillance information may leave New Zealand exposed to the undesirable establishment of emerging pests.

5.1 Roles and responsibilities are not sufficiently clear to allow the system to function effectively

Because the benefits of pest management are often shared or diffused, there can be a lack of incentives for individuals to take action. The Biosecurity Strategy 2003 began to address this problem by assigning a leadership and co-ordination role to MAF, and calling for ongoing work to clarify roles and responsibilities.

While some ambiguity within the sector is likely to always exist, and at times may be helpful, further clarification of roles and responsibilities within the sector is desirable.

5.1.1 Relative roles and responsibilities of actors within the system

Interviewees and the Steering Group emphasised the difficulties of the existing legislation generally enabling pest management, rather than requiring organisations or individuals to take action. Because no one is able to be held responsible, the incentives and mandate to undertake pest management can be weak. By way of example, the lack of responsibility to take action may see pest management squeezed within Regional Council budgets.

Roles and responsibilities need to be clarified at all levels. Related to this, is an understanding of how organisations at different levels of government will interact with each other to achieve both national and local objectives and maximise the benefits from pest management activity.

Areas for clarification of roles and responsibilities include:

- Between central government agencies.
- The relative roles and responsibilities of central and local government.
- The responsibility of landowners relative to central and local government.
- The responsibility of one land owner to other land owners.
- The responsibility of other agencies to support MAF in its leadership role.

Relative roles and responsibilities of central government agencies

Despite the existence of a memorandum of understanding between central agencies with an interest in biosecurity that sets out their relative roles, there still appears to be a lack of clarity around the relative role of MAF and DOC. This confusion seems to relate to DOC's role in advocating for the protection of indigenous biodiversity.

As noted by Sir Geoffrey Palmer, "The Conservation Act 1987 was unusual in that it gave a department a statutory responsibility to advocate the values of conservation against the world, including Cabinet under whose control the Department serves."[14]

By contrast, MAF has a responsibility to look across the biosecurity spectrum, balancing funding for different intervention points and the weight placed on values relevant to biosecurity.

Several interviewees raised the competing objectives of MAF and DOC as a problem. In contrast one interviewee acknowledged the tension, but did not see this as necessarily a problem as the tension is so well known.

Our assessment is that the competing objectives can be confusing for those at Regional Council level who are involved in the co-ordination of pest management activities. To them, there are two central government agencies with differing perspectives, and this makes co-ordination and co-operation more difficult.

5.1.2 MAF's co-ordination and leadership role

Since the release of the Biosecurity Strategy, MAF has taken a number of steps to provide leadership to the sector. These include working with other central government agencies to better determine arrangement of responsibilities at this level, establishing decision making and consultation forums at various levels between central and local government, and initiating a number of partnership based pest management programmes.

The comments of interviewees suggested that there is a gap between their expectations of what MAF should do and what interviewees see or perceive MAF as doing. Areas where interviewees saw a greater role for MAF were around:

- Ensuring consistency of National and Regional pest management strategies.
- Articulating risks and trade-offs related to pest management, conservation and other outcomes.
- Advocacy for pest management.
- Providing technical knowledge and leadership.
- Co-ordinating planning and information sharing across agencies with pest management interests.

[14] Sir Geoffrey Palmer, Innovation in New Zealand Statute Law, paper delivered to celebrate the 20th anniversary of the Law Commission, 25 August 2006, at para 47.

MAF's ability to provide greater leadership to the sector is likely to be hindered by having relatively few levers with which to influence the sector. For example, given the lack of assigned roles and responsibilities, it is difficult for MAF to hold others to account.

5.2 Existing policy does not sufficiently encourage collective action or address the impact of a land manager's pest management decisions on their neighbours

Our economic analysis revealed a range of reasons why the level of pest management activity may be less than desirable.

Individual land owners are unable to capture the full benefits of the ecosystem values related to their land. This will lead to underinvestment in the protection or enhancement of ecosystems in a free market.

Additionally, because pest management is characterised by externalities – management or non-management of pests on one piece of land will affect pest impacts on neighbouring land - the individual will choose to undertake a level of pest management activity that will differ from the socially optimal level.

The externalities associated with pest management mean that it may be more effective when undertaken through collective action. Collective action introduces a range of information, contracting and policing costs, which then become another barrier to pest management activity.

These policy problems can create a lack of incentives for individuals to act, even when a pest problem can be predicted and the case for action would appear justified on economic grounds – for example, management of rabbits. Examples of reluctance to act can also be found in the case studies.

Policy to address

Presumably to help offset these policy problems and lack of incentives to act, the Crown has intervened in the markets and regulatory environment related to pest management. These interventions include some funding for the protection of biodiversity and providing tools to facilitate collective action (i.e. regional and national pest management strategies). These collective action tools allow individuals access to means of binding and enforcing others to participate in pest management where this is in the interests of the "greater good".

However, there are some economic problems which current policy does not appear to address. For example, there are no central government interventions aimed at addressing the externalities that arise between landowners relating to whether or not they manage pests on their properties. Additionally, the range of tools to overcome

transaction costs and allow binding collective action are limited to regional and national pest management strategies (and legal contract). The cost to utilise these tools appears relatively fixed regardless of the nature of the proposed strategy or the person / organisation proposing the strategy. National Pest Management (NPMS) and Regional Pest Management Strategies (RPMS) are also about binding individuals, rather than allowing organisations to bind each other.

While RPMSs and NPMSs allow binding collective action, the Crown as a land holder can not be bound by RPMSs unless it agrees to be bound. The Crown's exemption is a controversial issue in the sector and covered in the Discussion section.

5.3 Legislative tools available to central and local government to undertake pest management under the Biosecurity Act 1993 are rigid and may not be fit for purpose

Central and local government agencies are restricted to undertaking pest management activities consistent with the legislation under which they operate. The key tools for pest management are those under the Biosecurity Act relating to Unwanted Organisms, national and regional pest management strategies, and limited emergency powers for government.

Regional Councils are able to undertake pest management spending primarily through the establishment of RPMSs. Interviewees indicated that the RPMS was seen as a cumbersome tool, not allowing Regional Councils much flexibility to respond to changes in pests of significance during the strategies' five year life span. It was suggested that at times Regional Councils may instead use "work arounds" to allow them to undertake what were essentially pest management activities without relying on pest management powers.

Additionally, the hurdles required of Regional Councils to put in place a RPMS are the same as those for any member of the public, thus ignoring the Regional Councils' status as elected bodies, with existing checks and balances on the use of power, and the ability to levy funds and spend these.

The tools under the Biosecurity Act 1993 are pest focused, and may not be fit for purpose for alternative approaches to pest management, such as pathway management or site focused activities.

It is also noted that central government has not utilised NPMSs, choosing instead to undertake pest management activities through other sections of the Biosecurity Act and partnership arrangements.

5.4 The tool box of physical controls for pest management is not sufficient to allow effective management of pests

A consistent theme from all people spoken to in our research was a concern that the tools available for pest management are reducing. Concerns were two fold; increased barriers to the development or importation to New Zealand of control tools, and the decreasingly social acceptability of utilising those tools.

Development or importation of control tools

Interviewees believed that increasing regulation of the use of tools is occurring under the RMA. At the same time, some interviewees saw increasing barriers to development or entry into the New Zealand market for new tools being posed by ERMA. Trends in chemical development towards highly targeted tools were seen as a positive for effective pest management, but would reduce the potential sales in New Zealand. Increasing barriers to the importation of chemicals, particularly those that have very specific uses, may make it cost ineffective for overseas chemical companies to gain approval to sell into the New Zealand market.

Interviewees recognised the importance of domestic scientific research in the development of new tools for pest management, particularly those for specifically New Zealand pests. Concerns were raised about the mechanisms of funding for science affecting the long term capability of the sector to respond to new pests.

Social acceptability affects utilisation

Much of the reason for the decline in the tools available was linked by interviewees to public perceptions of risk and lack of understanding of the importance of the control tools.

For instance, public concern about the use of 1080 continues, and some of the continuing concerns are largely unfounded.[15] Interviewees suggested that the use of unpopular spray programmes over urban areas has reduced public acceptability of spraying tools and reduced public trust in the sector. A dichotomy was also identified, in that those who are assumed to most highly value the indigenous environment appear to often be against the tools that may offer the greatest effectiveness in protecting the

[15] Green, Wren, *1080 or not 1080 – Is that the question?,* Address to the Annual General Meeting of the New Zealand Royal Forest and Bird Protection Society, Wellington, 23 June 2007.

environment. For example, "green" groups against the use of chemical controls, or Forest and Bird advocating for a GM-Free conservation estate[16].

[16] Refer Forest and Bird Genetic Engineering policy, passed at the Forest and Bird Society's Council Meeting, June 2002.
http://www.forestandbird.org.nz/AboutUs/policy/geneticengineering.asp

National Pest Plant Accord

The National Pest Plant Accord (the Accord) came into effect on 1 October 2001. The Accord is a cooperative agreement between the Nursery and Garden Industry Association, Regional Councils and government departments (primarily MAF and DOC) It grew out of concern that weedy species, including some listed in Regional Pest Management Strategies, were being distributed through the plant nursery trade

The Nursery and Garden Industry Association is the representative body for the New Zealand horticultural industry. It consists of over 500 members, including growers, retailers and suppliers of dry and green goods, and fertilisers.

The Accord identifies pest plants that are prohibited from sale and commercial propagation and distribution across the country. All plants listed on the Accord have been declared unwanted organisms under the Biosecurity Act 1993. This ensures that the plants are considered pests nation-wide, and allows their management before the pest becomes established or widespread.

Under the Accord, Regional Councils undertake surveillance to ensure the pest plants are not being sold, propagated or distributed.

The Accord is not a pest management strategy. It is a non-statutory agreement between member parties. The process followed to establish and review the Accord is separate from processes to establish and review pest management strategies. The choice to use a non-statutory agreement and the classification of unwanted organism, rather than an NPMS, highlights the potential challenges of putting in place an NPMS, particularly for a pathway control.

The Accord has a number of strengths, including:

- Demonstration of the value of working with industry to get a high level of voluntary compliance.
- The risk assessment and decision-making model that has been agreed with industry and is informed by an independent panel of risk assessors.
- Keeping compliance costs low as industry encourages members to comply.
- Spin off benefits for pest management control, as nursery staff and their customers become more conscious of the biosecurity risks associated with the movement of commercial plants.

However:

- There is some concern that it tends to address known rather than emerging risks.
- Not all of the industry is voluntarily involved. However, the restrictions related to unwanted organism status apply uniformly, including to all plant nurseries and casual markets (e.g. road side stalls).

5.5 Secondary problems

Central government agency spending approaches do not encourage additional investment by other organisations or individuals

The lack of performance measurement information is an identified problem within the sector and one which MAF is seeking to address through the development of measurement systems. However, if the central government is to fund aspects of the pest management system, it will need to be confident that the way in which funding is used is effective.

Crowding out – where government spending displaces private spending – is a common public policy problem. As discussed in the current state institutional analysis, existing central government spending approaches of fully funding some pest programmes appear to be crowding out spending by Regional Councils.

Additionally, there is limited use of contracting out by some central government agencies. In the case of pest management, contracting out is likely to provide a range of benefits, such as reducing the marginal cost to other organisations to undertake additional activity and maintaining capability in some regions or smaller organisations.

Delays in acting on surveillance information may leave New Zealand exposed to the undesirable establishment of emerging pests

Good surveillance of existing pests allows for intervention if existing management approaches appear ineffective. Early intervention may prevent increases in ongoing pest management costs.

Interviewees commented on the variability in both the level of surveillance that occurs across the pest management system, and the ability of the system to respond accordingly. This is of concern where the variation is not the result of measured decision, but instead due to an accident of history, poor incentives to act, or lack of resource.

To be worthwhile, surveillance must occur for a purpose – and be connected to a system and capability to undertake early intervention in response.

There appears to be a disjuncture between the pest management expert view, and the public view, regarding what is a pest and the size of the emerging pest management problem in New Zealand

Definitions of a pest

Research commissioned by MAF shows that non-expert groups tend to define a pest by what directly affects them, or what they value.[17] The 11 national interest pests[18], selected by experts, lacked relevance to non-expert groups - with many expressing surprise at what was on the list, or not having heard of the pests listed. This lack of relevance demonstrates differences between what is viewed as a pest by experts and the level of understanding and view of pests held by non-experts.

Non-experts tend to see pests as being introduced species and a threat to natives. LECG interviewees considered that indigenous species out of balance with the environment could be pests.

Extent of the emerging pest problem and interest in controlling pests

Most of the experts we interviewed had concerns about the future pest burden for New Zealand. Interviewee responses indicated that all the trends suggest a deteriorating situation over time across every sector and ecosystem. Some interviewees went so far as to put our future pest burden as one of the 2 or 3 key factors dominating the future sustainability of our economic and recreational choices, along with climate change and water.

Non-experts tended to see a pest as being defined by being something that is out of control. Pests may either be able to be managed, or must be lived with, but they will not be able to be controlled. Because the definition of a pest is highly personalised, the extent of the pest problem and the need desire or need to control pests will depend upon the effect of the organism on what the individual values.

Many LECG interviewees identified the general public as being more concerned by the threats posed by pest control tools or the measures used in pest management, than by the threats posed by the pests. This concern may be more a reflection of the concerns of a vocal minority, as opposed to a silent majority.

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[17] ACNeilson, Executive Summary of Pest Management Formative Research, August 2008

[18] Selected as part of MAF's National Interest Pests management programme

6 Discussion of issues and implications

The problems defined in section five raise a number of issues. In particular:

- If roles and responsibilities are to be better defined, how should they be determined and who will meet the cost of these responsibilities?
- If the Crown were to address the impact of one neighbour's pest management decisions on another neighbour, should the Crown be subject to the same rules?

These issues are discussed below.

6.1 Assigning greater responsibilities for pest management

The pest management provisions of the Biosecurity Act 1993 are based on enabling those who have an interest in pest management to take action and put in place either a national or regional strategy to manage pests (NPMS and RPMS respectively). The lack of clear roles and responsibilities is considered by the Steering Group to be the key problem in the system's effective functioning.

Any decision to assign roles and responsibilities raises the issue of who should do what, and who should bear the cost of those actions.

The majority of people we spoke to were focused on the role of central and local government in pest management, and clarifying what these organisations should do. However, in order to achieve a "joined up" system, and for the purpose of considering where the costs of pest management should fall, we suggest that there are two other groups whose roles and responsibilities should also be explicitly considered:

- Exacerbators (in this report we use the term broadly, meaning those whose actions of behaviours risk spreading pests); and
- Landowners, particularly those who fail to reasonably prevent pests on their land negatively affecting or spreading to their neighbours.

6.1.1 Guidelines for determining the role of local government relative to central government

The issue of appropriate roles for central and local government arises wherever the Crown asks or requires Regional Councils to administer legislation on their behalf, such as the Resource Management Act, dog control, or building controls.

The Department of Internal Affairs (DIA) is responsible for the Local Government Act 2002, and advises on and broadly manages the central government's relationship with Local Government. In December 2006 DIA published policy development guidelines for

regulatory functions involving local government.[19] The publication of the guidelines was agreed to by the Central Government / Local Government forum.

The guidelines set out three broad reasons why it may be desirable to involve local authorities in the implementation of government regulatory policy. They are:

- Local discretion - to provide scope, within the overall national policy objectives, for local or regional communities to exercise choices concerning the nature and extent of the regulatory regime to be implemented in their district or region and to achieve outcomes of benefit to the district or region.
- Local circumstances - where effectively attaining national policy objectives requires implementation that is tailored to particular circumstances that may vary between districts and regions.
- Information or resourcing synergies - with activities already undertaken by local authorities, such that local authority implementation is the most cost effective option.

The guidelines require attention to be paid to funding impacts of policies on local authorities, particularly where costs cannot be recovered through fees, prices fines etc or represent an increase in spending by the local authority.

6.1.2 Responsibilities of landowners and exacerbators

Amongst the range of roles and responsibilities requiring further clarification was the role of landowners.

Under current legislative arrangements, land owners have very limited responsibilities to manage pests on their land, unless the pest is covered by a RPMS or NPMS.[20] However, the pest management decisions of a land owner are likely to have an impact on their neighbours, which is referred to as an externality.

This raises a question about property rights – does the landowner have the right to manage pests as well or badly as they wish? Or does the land owner have the

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[19] "Policy development guidelines for regulatory functions involving local government" refer to the DIA website at http://www.dia.govt.nz/diawebsite.nsf/wpg_URL/Resource-material-Our-Policy-Advice-Areas-Policy-development-guidelines-for-regulatory-functions-involving-local-government?OpenDocument&ExpandView

[20] New Zealand law does enable a legal action to be taken in private nuisance by one party against another. The RMA may also provide for enforcement action against private land owners, although action can not be taken against the Crown. The RMA may also provide for enforcement action against land owners. The Health Act 1956 may allow action to be taken if there is a nuisance of public health significance.

responsibility to manage their pests in a way that reduces the likelihood of the pest spreading to a neighbouring property?

New Zealand law does not currently create a clear property right either way, although the intent of most RPMS requirements is to place the cost on the land owner to manage.

By contrast, where pest management is occurring partly for a commercial benefit, MAF has a policy of trying to reach funding arrangements which involve costs being shared between the beneficiary, the land owner or exacerbator, and government.

Coase Theorem

The Coase Theorem[21] states that when trade in an externality is possible, and there are no transaction costs, bargaining will lead to an efficient outcome regardless of the initial allocation of property rights.

What the theorem suggests is that in order to achieve an efficient pest management outcome between a landowner and the potential beneficiary of pest management, a property right should be created. The property right should then be able to be traded. For example, creating a right that a land owner can expect to be free from the spread of pests that their neighbour could reasonably be expected to manage. If the neighbour did not wish to manage their pests, they could "purchase" the property right from the landowner by paying them to put up with unreasonable pest spread.

An alternative to allowing trading in the property right is enforcement of the responsibility through the use of appropriate penalties.

Similar questions of property rights and application of the Coase Theorem can be applied to exacerbators. Comparison can also be made to other areas of New Zealand law, such as sections of the RMA that require land owners to avoid, remedy or mitigate the adverse environmental affects of their activities. Or to occupational safety legislation, which requires employers to take "all practicable steps" to provide a safe working environment for employees.

6.1.3 Managing costs of pest management

Assigning responsibilities to regional and central government creates a risk that costs currently borne by the private sector will be shifted to regional and central government.

The economic criterion for efficient risk allocation requires that the party with the best information, capability and incentives to manage the risk at least cost should bear the

[21] For a discussion of the theorem and its history since it was first presented by Ronald Coase in 1960, refer to *Coase Theorem*, Francesco Parisi, University of Minnesota Law School, Legal Studies Research Paper Series, 07-12.

risk. Thus, in assigning responsibilities, careful consideration needs to be given to the incentives being placed on each actor within the system.

Application of the criterion for efficient risk allocation suggests that land owners and potential exacerbators should be encouraged to undertake pest management, both where this is of value to them and when they are best placed to manage the pest.[22]

Effectively, what we are suggesting is that the costs that landowners and exacerbators can create for others should, to some extent, be pushed back onto them or "internalised".

Placing responsibility for pest management on land owners and potential exacerbators to curb the costs they potentially place on others is based on the assumption that they can change their behaviours (or undertake new behaviours). At an extreme, changing behaviour could mean stopping the activity they are undertaking (or undertaking a new, highly expensive one). Because such extremes may not be efficient either, it may be more appropriate to expect "reasonable" actions to be taken – or to set the penalty for not taking reasonable actions at a level that will encourage an economically efficient outcome.

6.1.4 The role of the public in supporting pest management

The problem definition outlines that there is an apparent disjuncture between the view of experts and the view of non-experts regarding what is a pest and the size of the emerging pest management problem in New Zealand.

While experts may overstate the size of the emerging problem, simply because they are faced with it every day, it seems likely that the pest problem will continue to grow significantly over the next 10 -15 years.[23] Some interviewees suggested that the good news stories, (kakapo recovery, mainland islands, landcare group progress, removal of urban weeds, etc) have left a warm glow with the public.

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[22] In the section on options for improvement, the creation of a property right to achieve this outcome is put forward. For a discussion of why the right should fall as a liability on the land owner and exacerbator, refer to the discussion of nuisance in Epstein, Richard A, *Holdouts, externalities, and the single owner: one more salute to Coase*, Journal of Law and Economics, Vol 36, No1 part two, 1993.

[23] Trends within the pest management environment give credence to suggestion that the pest management burden may be expanding. A number of legacy pests that have been relatively well managed in the last 15 years appear to be returning to prominence, for example rabbits appear to be developing resistance to RCD and wild game markets have seen price weakening, reducing interest in commercial game hunting. Additionally, it would seem likely that the rate of appearance of new pest species to New Zealand would outstrip technological changes that would allow eradication of existing pests.

There are likely to be many issues that the public will not fully appreciate the significance of. In considering whether efforts are necessary to change the general public's understanding, judgement needs to be made about whether pest management warrants education over other issues; it seems likely the public can only absorb a limited amount of general education and behavioural change.

Public understanding of the pest problem and pest management matters because cost-effective management of pests requires public involvement and co-operation. The public are potential exacerbators, land care supporters and land owners. Differences in the perceived nature and size of the problem will lead to differences in willingness to take action, and whether the focus of effort is on the worst pests. In addition, the social acceptability of utilising the physical control tools for pest management depends on the understanding of the public.

Discussion of the disjuncture between experts and the public

The general public's lower level of concern about the pest management burden could be for many reasons, ranging from public ignorance to a rational judgement that compared to other problems facing New Zealand pest management is sufficiently addressed. Even DOC staff have been quoted as valuing increased health spending ahead of increased conservation effort[24].

6.1.5 Purpose statements

Several interviewees commented on the insufficiency of the existing purpose statement for Part 5 of the Biosecurity Act 1993 (the Act), and suggested this as a tool for clarifying roles and responsibilities in the pest management system.

Purpose provisions, relating to all or a specific Part of an Act are included in many pieces of legislation. These provisions are designed to indicate the broad policy objective of the particular Bill.[25] While the purpose statements may help with interpretation, they are not a substitute for the detailed provisions of the bill itself.

Thus the insertion of a stronger purpose statement into the Biosecurity Act to better define the responsibilities of central and local government would be inappropriate unless these roles were defined within the provisions.

6.2 The Crown as land owner

The issue of land owner tenure neutrality in pest management legislation is significant to Regional Councils.

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[24] Dominion Post 30 August "What's up DOC?"

[25] Parliamentary Counsel's Office, Annual report for the year ended June 2002

Current legislative arrangements mean that the Crown as a landowner is not bound by regional pest management strategies (RPMSs), unless it specifically agrees to be bound. The Crown has not agreed to be bound to any regional council RPMS, but as a show of goodwill allocates funds for the purpose of managing pests included in Regional Council RPMSs. The funds allocated for RPMS related work on Crown land are considered by Regional Councils to be insufficient, and they believe that the Crown is not meeting its responsibilities as land owner.

6.2.1 Appropriateness of the Crown land being subject to regulatory tools for pest management

Cabinet Office Circular CO (02) 4[26] provides advice on whether the Crown should be bound by an Act or part of an Act, based on advice considered by Cabinet from the Ministry of Justice and the Law Commission.

Creating an unfair cost to third parties is listed as a factor in favour of binding the Crown. The potential externality impact on neighbours of poor Crown land management argues for the Crown being bound by pest management rules in the same way as any other land owner.

Off setting this, though, is that cost is a factor raised by the circular for excluding the Crown from being bound by an act, and application of Acts to Crown land is signalled for particular consideration. RPMSs apply across a whole property and are approved by Regional Councils, following consultation processes. By agreeing to be bound by regional council RPMSs, the Crown would face an unknown level of cost.

The hurdle that RPMSs are required to pass in order to be introduced is set at a regional level. Primarily, central government will be concerned with issues of national significance. The pests managed through RPMSs may or may not meet the hurdles for a NPMS.

[26] Refer DPMC website

7 Options for improvement

In this section we outline a range of ideas for addressing the problems raised in the problem definition. The ideas fall into two types; those that could be implemented within the existing legislation, and those that would require legislative change to implement.

7.1 Options within the existing legislation

The following ideas could be implemented, to at least some degree, within existing legislation:

- Encouraging and enabling more collective action amongst landowners.
- Providing greater seed capital for pest management activities related to biodiversity outcomes.
- Having a single manager of the pest management tool box.
- Social marketing.
- Improving the response to findings from the surveillance system.
- Review approaches to spending and contracting.

Each is discussed in more detail below.

7.1.1 Encouraging and enabling more collective action amongst landowners

Collective action – groups of landowners within a geographic region working together to manage a pest species – helps to overcome the externality problems common in pest management and makes the efforts of each individual more effective. Central to successful collective action is a shared objective. For landowners, this may be a pest to economic production, such as rabbits, a pest that is part of a management strategy which they are all bound to comply with, or simply a pest that for landcare reasons the group feels sufficiently motivated to wish to manage.

The range of tools to overcome transaction costs and allow binding collective action are limited under the legislation to regional and national pest management strategies. But there are opportunities to create or encourage tools other than specified in the legislation. The following ideas could be led or co-ordinated by MAF, with Regional Council assistance to implement and make landowners aware of their existence.

- Model agreements and approaches for how landowners within an area can work together. Model agreements can either be picked up off the shelf, or provide landowners with a picture of how they can form their own arrangement.
- Access to authoritative, independent advice on approaches to pest management. At present, some fact sheets on management of various pests are available through different Regional Councils, and most are also active in providing advice, particularly when this is requested. However, there does not appear to be a single centralised web based source of information on managing a wide range of pests in New Zealand environments. Anecdotal evidence suggests that often farmers' first point of advice on pest management will be the person who will sell them the chemical to manage the pest, and that person may not be incentivised to inform them of the full range of management options.
- Greater access to co-funding to help develop collective strategies for the long term management of pests. Such funding should be targeted in ways to encourage collective action and the use of available best practice, without subsidising existing activity. Some existing funds, such as the Sustainable Farming Fund, will consider supporting the development of pest management plans where there is a fit with the fund's specific objectives, but are not aimed specifically at supporting collective action in pest management.
- A low level threat of intervention to enforce the management of pests covered by pest management strategies may also act as a "stick" to encourage the co-operation of more reluctant parties.

7.1.2 Providing greater "seed capital" for pest management activities associated with biodiversity outcomes

Reference and Steering Group members commented on the existing level of public involvement in landcare and conservation groups that undertake pest management activities in order to protect indigenous biodiversity values. Members of the Steering and Reference Groups felt strongly that further untapped potential exists to increase the size and significance of this movement, and that greater "seed capital" should be made available to fund projects that landcare and conservation groups are willing to contribute their labour to. Provision of seed capital appears to have significantly stimulated landcare activities in a number of the overseas jurisdictions we studied.

The greater the role that the public is willing to play in pest management, the easier it will be for any emerging pest management burden to be met. However, Reference and Steering Group members also noted that public enthusiasm is likely to be limited to biodiversity or cultural values, leaving local and central government, and landowners, to manage pests affecting production and public health.

No assessment was made of whether the funds for these groups should be additional to, or reprioritisations of, current spend on pest management for indigenous biodiversity and cultural outcomes.

7.1.3 Having a single "manager" of the pest management tool box

By tool box, we are referring to the range of physical control tools available for undertaking pest management activities, such as traps, sprays, and biological controls.

A consistent theme in interviews with pest management experts was that the pest management tool box was likely to become insufficient to manage pests effectively.

Concerns were less about the development of new science-based control techniques, and more about the ability to access and utilise the tools available in a timely manner. Part of the access and utilisation concerns related to the acceptability of some tools to the public. Some of the concern also related to the ability to access these tools in a timely manner when New Zealand is a relatively small market.

There are costs for those who have developed or own the technology gaining approval under the Hazardous Substances and New Organisms Act from the Environmental Risk Management Authority (ERMA) to introduce new substances or organisms into the country. The herbicide Endothall is an example of a tool required to manage a new fresh water pest problem, but was not approved for use in New Zealand. What made Endothall significant was that the herbicide was registered for use after a consortium of potential beneficiaries provided the substantial funding and effort to achieve registration; often there is not the co-ordination and leadership across potential users to work together to get registration.

Role of a tool box manager

A single tool box manager would effectively be a centralised representative of all end users for the tool box and tools being developed. The manager's responsibility is to understand the users' needs and interests, and manage risks and trade offs on their behalf.

A single "manager" of the pest management tool box would see one government agency take responsibility for ensuring the tools that those undertaking pest management need exist, can be utilised appropriately and in a timely manner, and are used in a responsible way that will not reduce the ability of others to use those tools.

The role would include the identification of risks and opportunities for the tool box from all sources, including scientific, social concerns, regulatory and decisions on how tools are used. The tool box owner would need to consider how best to address these risks, and have the resources to either take action, or effectively influence others to take action, in order to address them.

The extent of the powers of the tool box manager could be set up as a strong ability to influence existing regulators and manage through the current regulatory system, or could extend to replacing existing checks and balances, e.g. the role of local medical officers of health in approving pesticide drops.

Information and issues that would need to be considered by the tool box manager include:

- How any new pest incursions are likely to be responded to (e.g. transition to long term management) and ensuring the likely tools required can be accessed in a timely manner.
- Addressing social barriers to utilisation, including through entering into dialogue with interested groups and articulating reasons for the tradeoffs involved in pest management.
- Influencing how tools and techniques are used in other parts of the biosecurity spectrum, in order to ensure they do not become "tainted" for use in pest management. Many of those we spoke to asserted that the New Zealand urban public would never let itself be aerial sprayed again after the painted apple moth eradication campaign.
- Thinking strategically about the opportunities available for pest management and the needs of the different users undertaking pest management. Tools appropriate for use by volunteer groups, and which can help motivate them by seeing the outcome of their efforts, may be very different to those required by farmers.

The tool box manager does not necessarily need to "own" the tools they are managing. Instead they need to "know" the range and nature of the tools, have a (well informed) view on how and when they should be used, and the ability to disseminate this knowledge and refer a potential user to the expert who does own the tool.

We suggest that MAF would be the obvious government agency to take on the role of tool box manager. However, we are conscious of some negative interviewee comments about the level of trust between MAF and the New Zealand public. The suggestion was that MAF's decision making or approach to programmes such as the painted apple moth eradication had damaged public trust in MAF.

An alternative option to MAF leading such an approach would be for an organisation at arms length from MAF – with representation from MAF, regulators and the broader public – to play a role in advising on tool use and communicating with the public. For example, establishment of a council with representation along the lines of the Hawaiian Invasive Species Council.

Regardless of who the owner of the tool box was, consideration would need to be given to the appropriate funding arrangements (i.e. contributions by those parties with an interest in seeing particular tools registered through the ERMA process).

7.1.4 Social marketing

Social marketing presents an opportunity to engage the New Zealand public on pest management, and to begin to resolve the gap between expert and non-expert opinion. Public behaviours that limit pest spread and support pest management will be important to the effective management of pests in the future. Small changes in behaviour by the public as a whole are likely to be able to make significant differences to reducing the

spread of pests. For example, reducing the movement of exotic garden species from one region to another.

Social research will be an important component of pest management social marketing, in order to understand drivers of individual behaviour.

Examples of public involvement in pest management stem from those using water ways adhering to requests to use simple procedures for preventing the spread of didymo, to the active involvement of volunteers in land care groups.

In addition to setting the ground for behaviour change and greater involvement of the public in pest management, increased public understanding of pests is likely to:

- Allow a more sophisticated discussion and consultation on the trade offs made in managing pests effectively. For example, the irony of using "unnatural" chemicals to protect the natural environment.
- Allow those developing the tools to better address the concerns of those resistant to their use.
- Create a social and political environment where the need for bigger steps to address the problems – in terms of changes to legislation, institutional roles and spending trends – are likely to be better understood.

Another issue identified by interviewees that can potentially begin to be addressed through social research and marketing is the increasing divide between the perspectives of urban and rural communities in regards to pest management for economic purposes. There is a group of pests, such as fruit flies and moths, which arise largely from public exacerbation but the control of which is largely for the benefit of producer groups that will be challenging to achieve social support for the management of.

7.1.5 Improving the response to findings from the surveillance system

Delays in acting on surveillance information may leave New Zealand exposed to the undesirable establishment of emerging pests.

Surveillance can inform whether or not an existing pest management strategy is effective, and allow early intervention to prevent further spread.

Part of the MAF leadership and oversight role must be to ensure appropriate surveillance systems are in place. To be cost effective, the surveillance system must be clear about what is being looked for, why, and how the surveillance links to thresholds for when action will be taken.

While sight should not be lost of the opportunity to improve responses to surveillance information, at this stage we are hopeful that the problem will be relieved by the development of performance measurement systems for pest management, as this will improve the information base on which decisions are being made. Additionally, as

thinking on the role of pest management in biosecurity advances, opportunities to improve linkages and create a more integrated and targeted system will emerge. To this end, we understand a surveillance strategy for New Zealand is in development.

7.1.6 Review approaches to spending and contracting

Changes in approaches to spending of funds by central government agencies may better be able to encourage spending by others and help maintain capacity to respond to pests.

Different organisations use a range of models of service provision – from largely in house provision to largely contracted out. Given the relatively small size of the sector, we suggest that as well as considering efficiency and the usual range of contracting risks and benefits, central government should also be considering how best to encourage additional activity from other organisations, and how to use spending to develop and maintain pest management capability within geographic areas and other organisations.

Contracting out is often regarded as an efficient option where it is possible to specify what will be provided and hold the contracting party accountable for delivery. However, in pest management situations where there may be overlapping activities occurring with slightly different objectives, contracting out may be an opportunity for one organisation to induce another to undertake additional activity by reducing the marginal cost.

Similarly, care should be taken not to replace or crowd out the contributions that other organisations (including landcare groups and Regional Councils) are willing to make themselves. Many pest management programmes have a range of benefits to different people. The central government contribution should represent the social benefit of pest management that is additional to the private or regional benefits.

Contracting out also provides opportunities to build capacity for pest management in a region. As an example of how changes in contracting practice can affect the capacity of other organisations, we note the impact that the Animal Health Board (AHB) decision to bring most contract management back in-house from Regional Councils may have had. Several interviewees suggested that pest management programmes in smaller regions may have been significantly negatively affected by the change. (We do not intend the reference to AHB to be in anyway a judgement regarding the decision made by AHB, rather the example is included to illustrate the potential impact of changes in contracting practices, and thus the opportunity for central government organisations to have a positive impact.)

Net or marginal benefit analysis?

The economic analysis identifies that the ideal level of pest management activity is where the marginal cost equals the marginal *social* benefit. However, the decision maker is only likely to take into account the costs and benefits to them, rather than to society.

MAF's formal decision making processes include a number of criteria for helping determine whether a policy intervention is warranted. The key economic assessment suggested is net benefit analysis.

We suggest that, consistent with the aim of encouraging co-funding of pest management projects, and the idea that the central government contribution should be additional to contributions that others would be willing to make, it may be more appropriate to look at the marginal benefit gained from government funding. The intention of suggesting this approach is to ensure that the contributions other parties are willing to make are taken into account, and to reduce the "cost" of responding from the government's perspective.

An example of co-funding

Land Information New Zealand (LINZ), which manages various lake and river beds on behalf of the Crown, has a partnership in place with Meridian Energy to control the weed Lagarosiphon in Lake Benmore, where one of Meridian Energy's hydro generation stations is located. While damming of the lake has allowed certain types of weed in the lake to be introduced and proliferate, the operating easement granted to Meridian Energy does not place any responsibility on Meridian to manage aquatic weeds and the Regional Council's Regional Pest Management Strategy is not legally binding on the Crown. An extensive weed biomass can cause operational problems if they enter the turbines; it is common in other parts of New Zealand for screens to be used to prevent weeds entering the station.

Meridian Energy currently matches annual funding allocated by LINZ for the control and management of Lagarosiphon in Lake Benmore; LINZ is responsible for the pest control works, performance monitoring, planning and reporting.

The partnership has provided a benefit to lake users due to large areas of the lake being kept free of weeds, which is a direct result of the extensive control work programmes. The benefit to Meridian Energy is not having to install special screens to protect the turbines.

7.2 Options for improvement that would require legislative change

The following ideas for improving the pest management system would require legislative change and are discussed below.

- Introduce a property right to place some responsibility for pest management on potential exacerbators and those land owners who risk creating costs to others.[27]
- Alter RPMS and NPMS to provide Central Government and Regional Councils with more flexible tools that reflect their elected status and existing powers.
- Prescribe roles and responsibilities for central government and regional council in legislation.

7.2.1 Introduce a property right to place some responsibility for pest management on potential exacerbators and those land owners who risk creating costs to others[28]

Exacerbators of pest spreads, along with land owners who do not take reasonable steps to manage pests on their properties, risk imposing a pest management cost on others.

We suggest the creation of a property right based tool that places responsibility for taking reasonable actions to prevent pest spread on to land owners and potential exacerbators.

The property right would be introduced as a positive right for other land owners – we refer to it here as a "principle of freedom from pests spread by others." The focus would be behaviours, and on requiring potential exacerbators and land owners to take reasonable actions to reduce the risk of pest spread.

There are a broad range of options as to how a principle of "freedom from pests spread by others" can be defined and enforced. Examples of the options for introduction and enforcement include:

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[27] There are differing opinions regarding the extent and clarity of the responsibility for pest management placed on land owners and potential exacerbators under the RMA, and there are issues such as whether the RMA provides an approach to management that may warrant further exploration. Our proposal is put forward with the aim of providing greater clarity to establish principles around responsibility in biosecurity legislation.

[28] The authors would like to acknowledge the work of Prof. Paul Martin of the Australian Centre for Agriculture and Law, whose work and ideas have significantly helped to develop those outlined in this section.

- The principle being placed in legislation, but not enforced by any government agency. The principle may become the basis for discussions within communities about managing pests, encouraging collective action, or civil suits.
- Application and enforcement being restricted to certain pests, or pests related to certain values (such as production pests, indigenous biodiversity pests).
- Application being broad, but enforcement or penalties being limited.
- While not what we would recommend, the principle could be the basis for a strict liability approach in legislation.

Decisions on how the principle is introduced will affect the costs faced by land owners and exacerbators, and the equity issues that arise from the creation of a property right. The way in which the principle is applied and enforced will affect the incentives on exacerbators and landowners to help manage pests and the size of the remaining burden that will fall to local and central government to manage.

Owners of multiple-owned Maori land are one group which will require attention in considering the full equity implications of requiring a greater role for land owners in the management of pests. One person we spoke to who identified as Maori suggested that the approach to managing, and acceptance of pests in the Maori community may differ from that in non-Maori, with some small vegetable growers planting "1/3 for me, 1/3 for the whanau, and 1/3 for the pests". Maori land may be held with non- productive motives, with limited funds available for management, and issues associated with an owner "selling" are more complex.

Example of encouraging those who potentially spread pests to change their behaviour – the nursery trade

The National Pest Plant Accord (see case study) is a voluntary accord aimed at getting plant nurseries & retailers to help reduce the problems they in part cause by selling (spreading) weedy species. If responsibilities for taking reasonable action to prevent the spread of pests were introduced, combined with greater public awareness of what a pest is and how they spread, potential exacerbators such as nurseries and pet sellers would have stronger incentives to participate in such accords and take their responsibilities in helping to manage pest species more seriously.

An extreme example of nurseries as exacerbators comes from Victoria, Australia, where there have been two recent cases of nurseries, and several wholesalers, selling Mexican Feather Grass, (*Nassella tenuissima)*, a state prohibited weed. While investigations are ongoing, thousands of the plants appear to have been propagated and sold. As of August 2008 no nurseries appear to have been fined or charged in relation to the sales.[29]

7.2.2 Alter RPMS and NPMS to provide Central Government and Regional Councils with more flexible tools that reflect their elected status and existing powers

As noted in the problem definition, the key existing regulatory tools for pest management are RPMS and NPMSs. These tools were designed for private clubs seeking a mechanism to levy and bind people into taking collective action. The tools are inflexible and do not recognise the existing checks and balances on Regional Councils and central government.

A tool for Regional Councils

We suggest that rather than requiring Regional Councils to use RPMSs to justify undertaking pest management, Regional Councils be made responsible under the legislation for undertaking pest management to support regionally important outcomes. The strategies would be funded through general rates levies, or targeted rates and penalties, and may also put responsibilities on to individuals within the region to manage pests or risks of spread.

Prescribed responsibility would then be supported by the introduction of a new regulatory tool for use by Regional Councils. For example, introducing a *regional*

[29] Victoria Department of Primary Industries, *Mexican feather grass: state prohibited weed*, landcare note number LC0263, updated August 2008. Also refer to articles in The Age, *Big's W's little weed a major problem*, 20 May 2008, and *Bunnings risks fine for selling noxious weed*, 24 August 2008.

council pest management strategy which each regional council would be required to put in place and use as the basis of undertaking pest management.

The exact content and nature of a regional council pest management strategy will need consideration, but some features we suggest are that the strategies:

- Are strategic in nature, rather than a planning tool for council activities. Annual activity plans may then link off the strategy.
- Include identification of the regionally important outcomes that pest management supports.
- Discuss the range of pest management approaches available, and the general strategies that will be used (i.e. for different environments, pests or outcomes).
- Include consideration of how new pests to a region might be responded to during the life of the strategy.
- Include how any requirements on regional council pest management plans, introduced by central government, will be met (discussed below).
- Include provisions for monitoring performance of the strategies.
- Consultation requirements, and the five year life span, remain in place.

A tool for central government

In order to help ensure consistency and provide checks and balances on regional council activities, we suggest the introduction of a separate national regulatory tool for use by central government, administered by MAF.

The aim would be to place a national framework around the regional council pest management activities, where there are benefits for outcomes of national significance.

The types of powers provided through the central government tool will need developing, but possible examples include:

- The ability to require Regional Councils to put in place a strategy for managing a particular pest, pest pathway, or vector.
- Requiring the provision of information necessary to inform the national pest management performance monitoring framework.
- Requiring Regional Councils to put in place a monitoring and enforcement plan for those pests, pest pathways or vectors that Councils may be required to include in their regional council pest management strategy.

As a check on central government use of any regulatory tool we suggest that the central government be required to comply at the boundary[30] of all Crown Land with any requirements it introduces. Requiring application to Crown Land will help to improve perceived equity between land owners while avoiding the Crown being subject to Regional Council decisions.

Appropriate powers would need to be given to Regional Councils to allow them to raise funds to meet the costs of complying with, or ensuring land owners within their regions comply with, national regulations relating to pest management.

7.2.3 Prescribe roles and responsibilities for central government and regional council in legislation

There is a strong desire amongst those involved in pest management for clearer roles and responsibilities for central government and Regional Councils. Given the effort that has been put into partnership arrangements and shared decision making to date, the only effective response we see is legislative change.

We suggest that the following split of roles and responsibilities be incorporated into the Biosecurity Act:

MAF be responsible for regulatory oversight, providing national co-ordination and leadership, and management of pests for the purpose of achieving outcomes of national importance (complementary to DOC responsibilities).

Regional Councils be responsible for the management of pests for the purposes of achieving outcomes of regional importance (e.g. through a regional council pest management strategy). Regional Councils would be responsible for the implementation and enforcement of pest management strategies or requirements put in place by central government.

DOC, LINZ and other Crown land managers are required to manage Crown Land at the boundary in a manner consistent with any central government imposed requirements and support MAF in its national leadership and co-ordination role.

[30] We suggest boundary in the sense of consistency with the principle of freedom from pests spread by others. Thus the amount of land that would need to be managed, and how it would be managed, would depend on concept of taking reasonable actions to prevent the spread of a pest.

Summary of suggested roles and responsibilities if all policy suggestions were introduced

Description of suggested roles and responsibilities	
Organisation / actor	**Key roles and responsibilities**
DOC and other Crown land managers	No change from current role prior to review of tools for long term containment of wild animals and fresh water fish,[31] other than: • support MAF as toolbox manager. • operate within the national pest management regulatory framework and as Crown land manager subject to national regulations related to pests, consistent with the principle of freedom from pests spread by others.
MAF	Responsible for pest management to support outcomes where nationally important (complementary to the responsibilities of DOC) System oversight, including: • managing the pest management tool box. • managing the national pest management regulatory system, including supporting Regional Councils in implementation and enforcement of the regulatory system. • coordinating the pest & weed surveillance system. • undertaking performance monitoring of system & intervention effectiveness. Implement interventions to encourage collective action by landowners and other groups to manage pests. Identify and lead programmes to target pest pathways of national interest. Work with all other organisations to maximise

[31] The Biosecurity Strategy called for the review of tools for long term containment of wild animals and freshwater fish. Until this review is completed, it is assumed DOC should take a leadership role in these areas mirroring that of MAF in other pest management.

Description of suggested roles and responsibilities	
	effectiveness of delivery systems.
Regional councils	Undertake pest management within their regions in order to achieve outcomes of regional importance. Operate within the national pest management regulatory framework; including being consistent with any requirements introduced through central government pest management strategies for outcomes of national importance. Implement and undertake enforcement of the national pest management regulatory framework within their region. Support MAF in programmes to encourage collective action to manage pests and address pest pathways. Provide advice, and if necessary referral to MAF, on the best way to manage pests. Utilise the toolbox consistent with MAF management and advice.
Landowners and potential exacerbators	Take reasonable steps to manage pests on their property so that they do not spread to another person's property. Comply with all regulatory requirements.

MAF's leadership role

Under the Biosecurity Strategy MAF has been charged with providing leadership on pest management. Leadership is a highly subjective term and expectations of how MAF should demonstrate leadership varied amongst those we spoke to.

To us, key characteristics of a leader include being able to think strategically, communicating that strategy, and bringing out the best in others. We suggest that MAF should focus on exhibiting these characteristics in the way it approaches its responsibilities. MAF's ability to offer leadership will also be enhanced through clearer roles and responsibilities and specific regulatory tools for central government, through which it can influence the sector. However, the regulatory stick should be used sparingly, and we would hope that - as one interviewee described it – goodwill will remain the cement of the sector.

8 Pest management in the marine environment

Pest management in the marine environment poses particular challenges because, in general, marine areas are not "owned" by anyone in the same way as the terrestrial environment. Property rights relate to the right to take resources or to use a designated marine area for a given activity, and the Crown has ownership over the seabed. The lack of ownership over particular parts of the marine environment can reduce the incentive, relative to the terrestrial environment, for individuals to take protective action. In this way, the marine environment in New Zealand is at risk of exhibiting many of the same property rights and management challenges as seen in the *Tragedy of the Commons*.[32]

Marine biosecurity is considered to be in its infancy, and the low level of marine biosecurity capability in New Zealand is recognised by MAF Biosecurity New Zealand.[33]

8.1 Current responsibilities

In practice, MAF has taken a lead in co-ordinating marine biosecurity through the Marine Pest Management Partnership, between MAF, Ministry of Fisheries (MFish), DOC, industry and Regional Councils. While the organisations in the partnership all have an interest in the protection of the marine environment, accountabilities vary.

While MFish has an interest in the protection of the aquatic environment, consistent with the achievement of the outcomes sought by the Ministry, the Ministry does not have any accountability for biosecurity in the marine environment.

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[32] Reference to Hardin, Garrett. "The Tragedy of the Commons." *Science* 162 (1968): 1243-48. In this story, farmers have collective use of a piece of pasture. Each farmer owns sheep and has the incentive to put more and more sheep on the pasture to gain, privately. The overall effect of many individuals doing this overwhelms the carrying capacity of the pasture and the sheep cannot all survive. The lack of property rights over the pasture by any individual means that no individual is able to capture the benefits from better management of the resource.

[33] *Marine pest management partnership: building New Zealand's internal pest management capability*, Biosecurity Magazine, issue 56, 15 June 2007.

DOC has an interest in any pests to indigenous flora and fauna where the pest will impact on conservation values for which DOC is responsible. DOC also has responsibilities to manage marine reserves under the Marine Reserves Act 1971.

Regional Councils have responsibilities for the sustainable management of marine areas within the 12 mile territorial limit under the Resource Management Act, consistent with the New Zealand Coastal Policy Statement. The Coastal Policy Statement is promulgated by the Minister of Conservation.

The Marine Pest Management Partnership's focus is primarily on building domestic marine biosecurity capability to manage established marine pests.[34]

8.2 Marine environment management in the future – our thoughts

Given current low capability to undertake marine biosecurity, and the range of property right problems in managing the marine environment, we see little medium term opportunity for improvement upon the Marine Pest Management Partnership approach that has been taken by MAF.

The introduction of a general principle of "Freedom from pests spread by others" (as already proposed) will help to underpin the partnerships efforts in encouraging potential exacerbators to change their behaviours.

Given the lack of property rights, there is not the same opportunity to increase the responsibility for pest management on land owners. However, where the fisheries or aquaculture industries have an economic incentive to act, they should be encouraged to do so through policies to encourage collective action. Given weak incentives to act, that recreational users may also benefit, and low existing capability, there may be a case for co-funding of some responses between industry and government in the medium term.

If the marine industry and exacerbators are limited in their incentives and responsibilities to take action, a large proportion of the management burden will fall on Regional Councils and central government. The issue will then become how this burden should be shared.

Regional councils have suggested to us that their limited rating base over the marine environment reduces their ability to support pest management responses in marine areas. However, like a regionally owned park, the marine recreational area is managed for the enjoyment of those living in the council's area. The difficulty may be more a political one, that rate payers may not have the same connection and ability to access marine

[34] *Marine pest management capability building partnership terms of reference*

areas, so are in general more oblivious to pest problems occurring and less supportive of the use of council funds.

Under section 64A of the RMA (introduced in 1997), Regional Councils have the option of putting coastal occupation charges in place, as part of a regional coastal plan. Coastal occupation charges allow councils to charge individuals for benefits they might receive from occupying a coastal marine area that is owned by the Crown, but vested in the regional council. For example, charges could apply to wharves, jetties, boat ramps, boat sheds, moorings, marine farms, marinas, cables and pipelines. The charges can be used by the regional council for the management of coastal marine areas.

It is our understanding that no council introduced coastal occupation charges because of uncertainties in the law related to the nature of the charges, lack of methodology for how to introduce and equity issues associated with the likely exemption of some major ports (e.g. Tauranga) under historical occupation approvals.[35] In addition, prior to the Seabed and Foreshore Act of 2004, there was some uncertainty over the ownership of the coastal marine environment. The Proposed Coastal Policy Statement 2008 sets the expectation that Regional Councils will introduce occupational charges and clarifies the basis for determining the appropriate charges.

Clarification and introduction of coastal occupation charges may present an opportunity for Regional Councils to invest in the protection of marine areas.

One regional council chief executive spoken to made the point that the sea bed is owned by the Crown, therefore the Crown should be responsible for pest management of the water above it. The CE considered the purpose of the occupation charging to be either too unclear, or insufficiently related to pest management, for the charges to be utilised for marine pest management.

We suggest the 10 – 15 year aim would be for similar roles for MAF, DOC and Regional Councils in marine pest management, as in the terrestrial environment, to be in place. However, in the short term, a greater role for central government may be required, while Regional Councils introduce occupation charges and build their capacity in marine pest management.

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[35] "Coastal Occupation Charges", report to the strategic policy committee of Environment Bay of Plenty from John Whale, Manager Environmental Planning, 23 January 2007. refer http://www.ebop.govt.nz/media/pdf/SP130207-Coastal.pdf and refer http://www.envbop.govt.nz/Coast/Coastal-Occupation-Charges-Plan-Change.asp as at 18 July 2008. Also refer "Proposed New ZealandCoastal Policy Statement 2008, Evaluation under section 32 of the Resource Management Act 1991", Department of Conservation, February 2008.

Didemnum vexillum – an opportunity missed?

Didemnum is really a tale of two parts and illustrates both the problems of responding to a marine incursion and of managing an established marine pest.

Didemnum vexillum, an ascidian or sea squirt, was first observed, in New Zealand, in October 2001, smothering wharf-piles and moorings at Whangamata. The organism colonised a large ocean-going barge that was finally abandoned near the port of Picton, a major site of the New Zealand green-lipped mussel industry. As the company owning the barge had failed, legal responsibility for the barge fell to Port Marlborough. The infestation was detected in December 2001. However, as the evidence of invasiveness was still disputed there was no consensus on what should be done and critically no single agency or organisation was willing to take responsibility for dealing with the problem at that time.

There were also no tools available for responding to such an infestation and no precedents to learn from.

There were a range of industry and government organisations that had an interest in seeing Didemnum eradicated or controlled and were prepared to contribute to these aims. But the process experienced by those involved reflects the difficulty of agreeing on and taking collective action. Without a clear status on the invasiveness of the pest, it was unclear where leadership for dealing with the issue would come from – reflecting the lack of clarity around roles and responsibilities. Stakeholders' differing perceptions of where costs and benefits lay also hampered compliance with a voluntary programme.

The significant positive that came from the Didemnum situation is the investment made in the development of marine biosecurity tools (partly supported by MAF). The treatments applied in the programme have included smothering colonies with uncontaminated dredge spoil, wrapping wharf piles with plastic, smothering rip–rap (erosion protection) habitats using a geo textile fabric, and various other approaches based on water-blasting, air-drying and chlorine dosing. All have proven effective to varying degrees and are now available as innovative tools in for use in future marine biosecurity programmes.

Coutts and Forrest[36] in their review of this incursion identified seven particular requirements for effective responses to marine incursions :

[36] Coutts ADM, Forrest BM 2007. *Tools for incursion response: lessons learned from the management of the fouling pest Didemnum vexillum*. Journal of Experimental Marine Biology and Ecology 342: 154-162.

(1) Baseline knowledge and an effective surveillance regime;

(2) Clear lines of authority and rapid decision-making;

(3) Commitment of sufficient resources to meet project goals;

(4) Proven treatment methods;

(5) Buy-in from stakeholders, and incentives for exacerbators to participate in management;

(6) Effective quarantine to prevent spread; and

(7) Effective project management and quality assurance procedures.

9 Comments and recommendations

9.1 The desired future state

The ideal pest management outcomes and systems in 10-15 years time will not necessarily differ from today, in terms of aspirations and characteristics. But the differences in the challenges and opportunities over this period will alter how this picture can be achieved.

The 2003 Biosecurity Strategy was aspirational, and we believe that the ideals it asks the biosecurity community to strive for remain relevant today, and into the future.

2003 Biosecurity Strategy

Pest management was contextualised as part of the spectrum of biosecurity activities, along with prevention and exclusion, and surveillance and response. The goal the strategy set for pest management was:

"effective management (including eradication, containment and control) of established pests and unwanted organisms capable of causing harm to the economy, environment and people's health."

Specific expectations of the Biosecurity Strategy for pest management were:

"That there is clear and effective national leadership and co-ordination of pest management activities within central government, local government and the private sector."

"That there are transparent and effective performance measures to monitor and forecast the establishment of pest and weed impacts and pathways."

"That the Crown meets its obligations as a landowner."

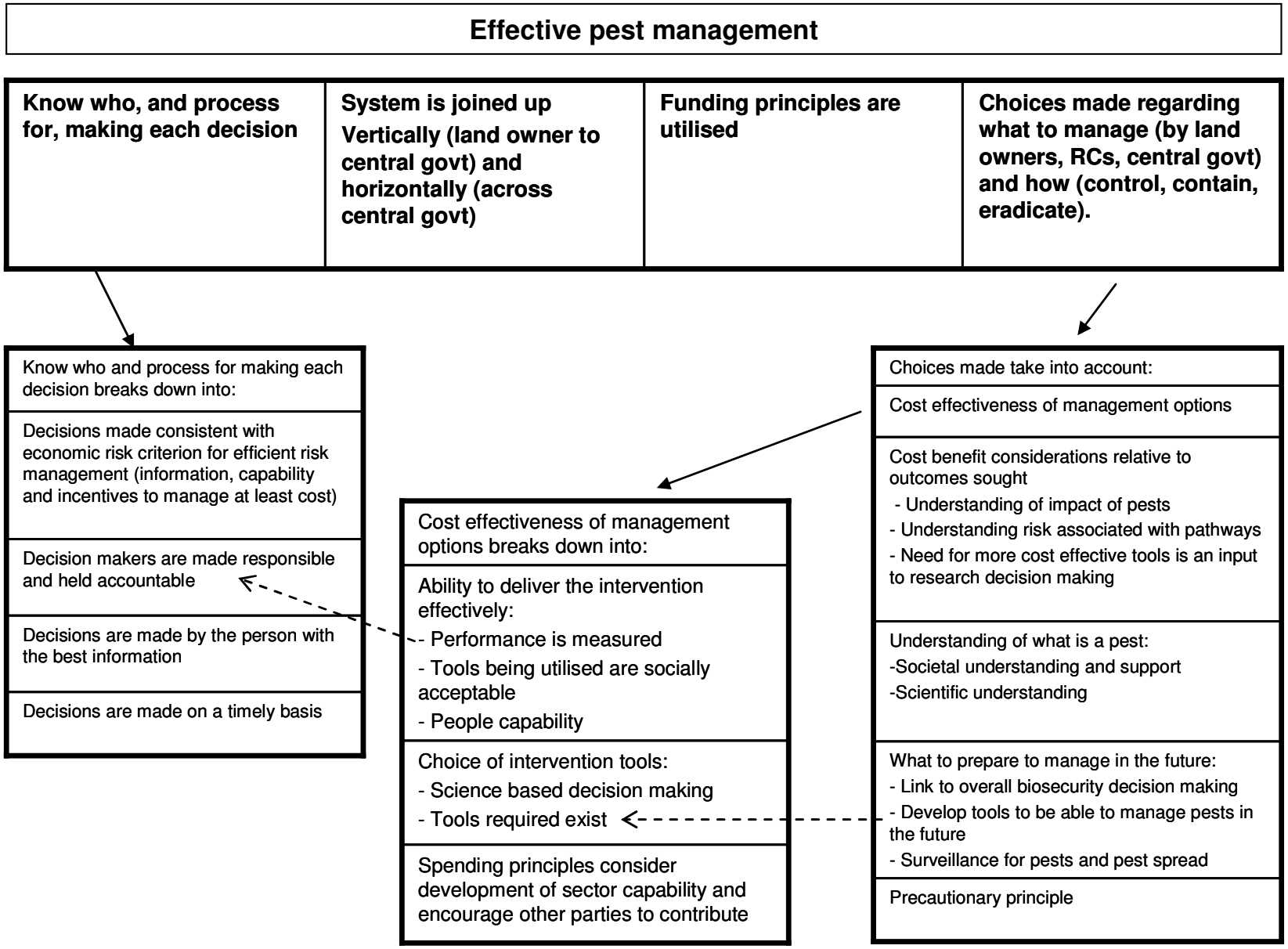
"That there is a routine programme of national and regional communication and co-ordination including ongoing assessment and review of both individual programmes and the overall system."

These expectations bring us back to the question of "what does effective pest management look like?"

The diagram over the page captures the components of effective pest management as distilled by the project team through our research, interviews and discussions with Reference and Steering Group members.

The diagram illustrates the key components of an effective pest management system, beginning with:

- Knowing who makes, and the process, for making each decision.
- Choices are made regarding what to manage and how to manage.
- Funding principles are utilised.
- The system is “joined up” both vertically and horizontally.


Effective pest management
Know who, and process for, making each decision
System is joined up
Vertically (land owner to central govt) and horizontally (across central govt)
Funding principles are utilised
Choices made regarding what to manage (by land owners, RCs, central govt) and how (control, contain, eradicate).
Know who and process for making each decision breaks down into:
Decisions made consistent with economic risk criterion for efficient risk management (information, capability and incentives to manage at least cost)
Decision makers are made responsible and held accountable
Decisions are made by the person with the best information
Decisions are made on a timely basis
Cost effectiveness of management options breaks down into:
Ability to deliver the intervention effectively:
- Performance is measured
- Tools being utilised are socially acceptable
- People capability
Choice of intervention tools:
- Science based decision making
- Tools required exist
Spending principles consider development of sector capability and encourage other parties to contribute
Choices made take into account:
Cost effectiveness of management options
Cost benefit considerations relative to outcomes sought
- Understanding of impact of pests
- Understanding risk associated with pathways
- Need for more cost effective tools is an input to research decision making
Understanding of what is a pest:
-Societal understanding and support
-Scientific understanding
What to prepare to manage in the future:
- Link to overall biosecurity decision making
- Develop tools to be able to manage pests in the future
- Surveillance for pests and pest spread
Precautionary principle

9.2 Behaviours and incentives

Pests are a potential risk to our economic, biodiversity, health and cultural outcomes.

Successful management of any risk relies on putting the right incentives on those with the best information and capability to manage that risk.

Incentivising action

The public and land owners have a considerable ability to affect the speed and extent of pest spread. For this reason, we believe these groups, or at least key subsets within them, need to be motivated to help manage pests. There are a range of tools for motivation, extending from education, to co-funding, to enforcing requirements for reasonable actions to be taken. We recommend that the full range of policy tools be utilised, and the debate moving forward should focus on the level of emphasis placed on each.

For the pest management system to be "joined up", roles and responsibilities also need to be assigned at the regional and central government level. History to date suggests that while self-interest will lead to considerable action, these interests do not necessarily overlap, leaving gaps in the system and unmet expectations.

There is significant good will between those involved in pest management. Care needs to be taken to ensure that motivation of actors starts from goodwill, rather than an unnecessarily heavy hand.

Removing impediments and ensuring effectiveness

Once motivation to take action is created, we need to ensure there is no impediment to action being taken.

All actors within the pest management system need access to an effective range of tools with which to undertake pest management. Tools refer to both regulatory tools and physical control tools.

Existing regulatory tools were designed for private clubs taking action on a regional or national basis, which wanted the power to levy and access considerable enforcement tools. These regional and national tools remain appropriate for some. In addition there is the opportunity to introduce models of less complicated arrangements for groups wishing to work together and share resources.

Regional Councils and central government need their own version of the regulatory tools, designed to help them fulfil their responsibilities.

Information on how to go about managing a pest is also important – there is an opportunity to make authoritative generic information on management of pests in the New Zealand context more widely available.

And there is also a gaping challenge in ensuring that the tool box of physical controls supports effective pest management. Managing the tool box is also about managing risk though the use of incentives on the way it is developed and utilised.

9.3 Recommendations

In section seven we outlined opportunities for improving the future effectiveness of pest management in New Zealand.

In this section, we provide some general recommendations related to where policy work on the future of the sector should head from here and the process for engaging the sector on these ideas.

9.3.1 Policy recommendations

We have put forward a number of ideas for policy tools that could be used to improve the effectiveness of the pest management sector.

We recommend that all of the policy options available should be explored and debated (discussed below) with a view to implementation. We see a key challenge for policy development to be around how these tools are introduced in a combination that provides the right incentives and a positive environment in which pest management can go forward. Important connections need to be made to the broader biosecurity system, the legislation and conventions surrounding local government, and the flow through implications of changes in property rights.

Our policy suggestions are split between opportunities within the existing legislation and opportunities for changing the legislation.

Opportunities for improvement within the existing legislation

- Encouraging and enabling more collective action amongst landowners;
- Providing greater seed capital for pest management activities related to biodiversity outcomes.
- Having a single manager of the pest management tool box.
- Social marketing to increase understanding of pests and how the public contributes to their spread or management.
- Improving the response to findings from the pest surveillance system.
- Reviewing approaches to spending and contracting by central government agencies.

We see these as the short term opportunities to improve the effectiveness of pest management activity, and would encourage MAF to pick each up as the subject of a full policy development process. The suggestion of a single tool box manager is more difficult, and careful consultation and analysis of the best way in which to achieve the concepts intent will be required.

Opportunities for improvement requiring legislative change

- Introduce a property right to place some responsibility for pest management on potential exacerbators and those land owners who risk creating costs to others (a principle of freedom from pests of others).
- Alter RPMS and NPMS to provide central government and Regional Councils with more flexible tools that reflect their elected status and existing powers.
- Prescribe roles and responsibilities for central government and regional council in legislation.

Prescribing the roles and responsibilities for central government and Regional Councils into legislation appears to be essential for clarifying roles and responsibilities in the sector. However, we would caution against only making this change. We see the three policy initiatives as highly interlinked.

Central government and Regional Councils only represent a small part of the overall pest management system, and without adjusting the incentives on land owners and those who risk spreading pests (who may be best placed to manage much of the pest problems), considerable cost may eventually fall to regional or central government.

Additionally, if Regional Councils and central government are to meet their responsibilities, they must have the tools available to let them do so in an efficient and effective manner.

Pest management is just one part of the biosecurity spectrum; if roles are to be defined and prescribed in the legislation for this part of the spectrum, it is probably necessary for a "joined up" approach that the role of Regional Councils in other parts of the spectrum are also defined.

9.3.2 Process recommendations – where to from here

The ideas set out above have been developed within the context and aims of the Biosecurity Strategy 2003, which called for the clarification of roles and responsibilities within pest management.

The challenge is how to take forward that thinking and put in place clear roles and responsibilities, while also addressing a number of associated challenges.

This think piece puts forward one way of clarifying roles and responsibilities, and addressing a range of other issues simultaneously. Some of our suggestions are fairly significant – for instance a principle of freedom from pests of others, even weakly implemented, would be a significant change in the principles underpinning the Biosecurity Act 1993. Other people will have suggestions on other ways of achieving similar outcomes.

We suggest that MAF begin a process of engaging with key stakeholders to gauge reaction to the proposals included here and see what other solutions are put forward.

At the same time, the suggestions here should also be subject to review and scrutiny by MAF's policy units.

The process and extent of debate should be appropriate to the size of the issue. We are primarily taking forward existing policy recommendations within one part of the biosecurity spectrum. We suggest putting a clear time frame around the debate and consultation process in order that the debate process does not prevent action.

Clarifying roles and responsibilities – short term

Given the significance and impact the lack of clarity of roles and responsibilities has on the sector, and the time delays inherent in changing legislation, consideration should be given to fast tracking consultation and debate over roles and responsibilities. If a framework were able to be broadly agreed upon by those involved, this should be voluntarily adopted to help guide the interaction and discussions of organisations until it is able to be given legislative weight.

Appendix one – Pest management in other jurisdictions

The following is a summary of analysis of pest management in other jurisdictions. Full case studies are included *Background analysis and interview findings*.

The approach to pest management in other jurisdictions varies by historical arrangements, the nature of pest issues, and the particular institutional and legislative structures. However, there is a growing acknowledgement that coordination within and between levels of government and between governments, the private sector and the community can be beneficial to effective pest management.

Australia

In Australia, pest management arrangements are characterised by federal border protection and quarantine being separate from state-based pest management. The federal government also supports coordination and information transfer between states and provides funding for targeted initiatives. Although pest management is largely seen as an individual state/local issue, national coordination mechanisms are developing. A key forum is AusBIOSEC, a committee on biosecurity issues made up of federal and state officials representing agencies related to primary industry and the environment.

Western Australia (WA) and New South Wales (NSW) provide examples of the range of differences in approach, and pest management system development, at the at the state level.

Western Australia

WA's pest management regime is in transition. With new legislation and a new stakeholder-based Biosecurity Council, it is moving from fragmented and agriculture-based legacy systems to a framework integrating biosecurity threats to the economy, the environment and public safety and amenity. WA is also attempting to shift pest management from a centralised government responsibility to one where landholders and other community members have a clearer and more direct role.

WA has traditionally applied 'pest rates' to pastoral areas to fund pest management activities but has foreshadowed broadening this to other areas and for a wider range of biosecurity activities. Regionally-based groups recognised by the State can access 'pest rate' funds for pest control and, increasingly, preventative and other biosecurity activities in specified areas.

New South Wales

In New South Wales, pest management arrangements appear to be highly dispersed without clear co-ordination. Processes for invasive species management and biodiversity protection are not necessarily aligned; for example, links between the Department of Primary Industry-led invasive species planning and the Department of Environment-led key threatening processes work are not clear. There is general acknowledgement of a

need for better prioritisation, clarity of relative roles and responsibilities, and better information to support the pest management task.

NSW has separate pest management regimes for weeds, vertebrate pests, invertebrate pests and aquatic pests, with each involving different institutional players. Private and public land managers, NSW Government, local governments, Rural Lands Protection Boards, Catchment Management Authorities and other government and quasi-government entities all have roles by legislation and convention. For example, weed management is characterised by:

- State-based weed declaration based on advice from a Noxious Weeds Advisory Committee;
- Private and public weed control; and
- Local government enforcement of weed legislation.

United States

Like in Australia, the pest management system in the United States has different roles for federal, state and local governments. Again, the system is characterised by federal prevention, with pest control and management at the state or local government level.

The National Invasive Species Council, made up of representatives of federal departments, helps to coordinate and ensure complementary, cost-efficient and effective federal activities in regards to invasive species. The Council's *2008 – 2012 National Invasive Species Management Plan* outlines strategic goals, five-year objectives and implementation tasks across five areas: prevention, early detection and rapid response, control and management, restoration, and organisational collaboration. A stakeholder-based Invasive Species Advisory Committee advises the federal government on invasive species issues.

Florida and Hawaii provide examples of different approaches at the state level.

Florida

Florida lacks a coordinated legislative regime for pest management, and the institutional frameworks to support consistent and strategic action have only recently begun to be established. Various legislative instruments established over time give a number of Florida state agencies responsibilities for different pest management activities, with a focus on direct control on public lands and waters. One recent mechanism to promote more strategic coordination of cross-state agency work is Florida's Invasive Species Working Group which shares information, builds public awareness and promotes incremental changes in institutional frameworks.

Some region-specific initiatives have been established, such as the Florida Department of Environment Protection Upland Invasive Exotic Plant Management Program. The Program brings together government, private, and community interests through regional working groups to address weed management issues at the local level, with clear goals

and targets, and power to set regional control priorities, develop long-term management plans, and design public education programs. Exotic plant control projects on public conservation lands are considered for funding based upon recommendations from these regional groups.

A number of not-for-profit organisations play a role in Florida pest management, particularly supporting industry information-sharing and public advocacy. For example, the Florida Exotic Pest Plant Council provides a forum for the exchange of scientific, educational and technical information.

Hawaii

Hawaii, the "endangered species capital of the [United States]", is under huge pressure from invasive species. No single agency is responsible for management of pests or invasive species in Hawaii. Major policy responsibilities are shared between the Department of Land and Natural Resources and the Department of Agriculture, who co-chair the Hawaii Invasive Species Council. With a focus on program and capacity shortfalls not currently addressed by state agencies, the Council includes five working groups on prevention, management of established pests, increasing public awareness, research and technology, and resources. The Council currently allocates about $4 million a year for pest control projects.

Much of the operational effort is provided by a series of regional (island based) Invasive Species Councils (ISCs). Each ISC is a voluntary partnership of private citizens, community organisations, businesses, landowners, and government agencies. They prevent, eradicate, or control priority incipient invasive plant and animal species that threaten Hawaii's most intact conservation lands. Increasingly, the ISCs are adopting strategies to enhance early detection and to prevent new invaders from becoming established through outreach and public education activities. They operate very openly and appear to be gaining a good level of public support and making some progress against the huge pest problems facing Hawaii.

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