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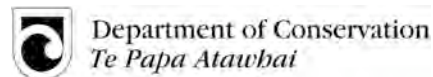
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Pesticide use for biodiversity management, 1987-2007

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Abstract

Successful management of invasive species is an important part of biodiversity management in New Zealand and involves a combination of six factors: an understanding of the problem; strategy; technology; capability; funding and community acceptance. Over the last twenty years we have extended the pesticide toolbox and improved its effectiveness by addressing one or more of those factors. A range of examples are provided in this paper including advancements in possum control and the eradication of rodents from islands. Despite the progress there is an imperative to continue to work on all these factors to meet future challenges which include a more rigorous regulatory environment, changing public perceptions, an increasing array of invasive species entering New Zealand, all of which put pressure on our ability to sustain adequate resources.

Key words: biodiversity management, conservation, invasive species, New Zealand, pesticide, pest management.

Introduction

New Zealand has a long list of human induced extinctions due to habitat loss and a range of invasive pests. This process continues today with many native species currently threatened with extinction and ecosystems being degraded as a result of browsing mammals. Successful management of invasive species is an important part of biodiversity management in New Zealand.

There are six components to successful invasive species management:

1. An understanding of the conservation problem to be addressed and how each pest species contributes to this, e.g. recruitment failure through egg predation by ship rats vs mortality of adult females defending nests from stoats;
2. A strategy which clearly articulates goals and priorities;
3. Technology and equipment which does the job effectively and efficiently;
4. Skills and experience to carry out the required tasks competently;
5. Funding;
6. Community acceptance of the strategy, funding and technology being used.

In 1987 pesticides played an important part in the pest control toolbox for species recognised as conservation pests at that time (Figure 1).

Pest:	Poison:	Trap:	Shoot:
Possum	✓	✓	x
Rodents	x	x	x
Ungulates	✓	✓	✓
Wallabies	✓	x	✓
Stoats	x	✓	x
Cats	x	✓	x
Rabbits	✓	x	x
Wasps	x	x	x
Ants	x	x	x
Fish	x	x	x

Figure 1: Pest control toolbox for biodiversity management as at 1987.

Today these tools are still important but over the last twenty years we have extended the toolbox to cover further species. We have also improved their effectiveness and efficiency by addressing one or more of those “components of success” described above (Figure 2). This paper discusses examples of improvements in these areas for pesticide tools and identifies potential areas for further advances to be made.

Pest:	Poison:	Trap:	Shoot:
Possum	✓	✓	x
Rodents	✓	✓	x
Ungulates	✓	✓	✓
Wallabies	✓	x	✓
Stoats	x	✓	x
Cats	✓	✓	x
Rabbits	✓	x	x
Wasps	✓	x	x
Ants	✓	x	x
Fish	✓	x	x

Figure 2: Pest control toolbox for biodiversity management as at 2007.

Improved understanding

Research into New Zealand ecology and pest interactions has been ongoing for decades. More recent research into the risks and benefits of pesticide use has provided information to allow more objective decisions to be taken about what tools are appropriate for pest control in what circumstances. For example, persistence and residue data emerging from studies of brodifacoum led to the Department of Conservation reviewing the ongoing use of products containing second generation anticoagulants.

Strategy

The New Zealand Biodiversity Strategy produced in 2000 provided a foundation for New Zealanders to understand the importance of pest control in biodiversity management. This has led to a number of initiatives to increase the level of control effort by local and central government as well as communities and individuals. The Department of Conservation continues to strive for robust priority setting to ensure sustainability of funding of ongoing projects.

Technology

The advent of global positioning systems is the most significant advance in the pest control industry. GPS based navigational guidance of aircraft sowing bait has enabled greater efficacy and efficiency allowing possum control operations to meet the challenge of rising costs. It has also made possible the eradication of rodents on large, rugged offshore islands such as Campbell (11300ha), Raoul (2941ha) and Hauturu (3083ha).

Examples of the current developments in new pesticides are the registration of zinc phosphide for control of possums, and PAPP (p-aminopropiophenone) for the control of cats and stoats.

Capability

For rodent eradications to be successful, the people involved need a high level of skill and experience. The Department of Conservation has used long lead in times to build the capability of individual project managers by involving them in eradication projects leading up to the projects they manage themselves. A technical advisory group has been instrumental in providing the support to these projects and developing better ways of sharing and transferring knowledge between projects.

Funding

Pest management funding has increased significantly over the last twenty years as recognition of the problems grew politically and among communities.

Community acceptance

Community ownership of the problems pests are causing has grown substantially since 1987. At that time a typical community conservation project involved volunteers planting trees whereas nowadays many community groups are involved in controlling pests and weeds. Community acceptance of the pesticide tools used remains variable between different tools and between different communities.

Future directions and challenges

The use of pesticides will continue to be a mainstay of invasive species operations for the foreseeable future. As a result, continuous development is required to improve the cost effectiveness of control operations. Finding ways to further reduce target species survival and manage reinvasion appear to be promising lines of enquiry here. There is a need for ongoing research into finding effective non-target mitigation techniques such as repellents that can be added to poison baits or delivery systems (bait stations) that restrict non-target access. We see scope for improved community awareness of the issues around pest control generally and the risks and benefits of pesticide use in particular.

Future challenges to the use of pesticides to control invasive species are:

- The regulatory environment has become more stringent in the 21st century, meaning it is more time consuming and expensive to register new pesticide tools. While we acknowledge the importance of assessing the environmental safety of pesticides, the costs and restrictions mean companies are unlikely to recoup costs of development in a small market such as New Zealand. This constrains development toward substances that might be easier to register rather than better for the job or better for the environment. This perverse disincentive follows through to pesticide use also where some people opt to use the product with the least paperwork rather than the one that which gives the best control.
- Public perception of pesticides is changing as the people become more urbanised. All pesticides are increasingly seen as bad as people have less personal experience in the use of pesticides and their potential benefits. At the same time there is an increasing expectation that a silver bullet (e.g. immuno-contraception) for many invasive species is just around the corner. An uninformed population is also more vulnerable to the media's use of "controversy" to sell itself. Despite the analyses of benefits/risks of using pesticides usually

coming out in favour of their use, conservation managers are still not good at presenting the facts and promoting the huge gains to biodiversity that have been made through the use of pesticides. At the same time any mistake made during the use of pesticides is indefensible and stays long in the memory of those affected or concerned by it. There is an ongoing imperative to act professionally and prevent mistakes happening if public acceptance or tolerance is to be maintained.

- With increasing globalisation and climate change there are likely to be an increasing array of invasive species entering New Zealand and at a faster rate than in the past. This will place ecosystems under greater threat and means that we will need to develop control techniques to deal with these new pests. Often it will involve the use of pesticides. At the same time there are some existing pests, for example mice, that we are still having difficulty controlling effectively. Further research is required to develop effective control techniques for these species.
- Sustaining adequate resources is also a key issue. If the benefits to biodiversity from the use of pesticides are to be maintained, there must be adequate funding of the work to ensure increasing costs are taken into account. This is increasingly difficult when the public expects government to provide good health care and other community services without increasing taxes.