

Beyond the vertebrates – what are the threats to forests in the conservation estate from new organisms?

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Most New Zealanders are aware that New Zealand is biologically and geologically distinctive with a high percentage of unique (endemic) species. Some of these species such as the kiwi, kauri, and kowhai are national icons that help to define the cultural identity of New Zealand. Most New Zealanders are also aware that this unique biodiversity is threatened by the variety of pests and weeds that have been introduced since human settlement began. Today about 1000 of our known animal, plant and fungi species are considered threatened, and collectively invasive pests pose the greatest single threat to our remaining natural ecosystems, habitats and native species (DOC/MfE 2000).

New Zealand has the highest number of introduced mammals of any country in the world and over 24,000 introduced plants, of which about 2000 are naturalised (DOC 1998) and approximately 250 are a significant threat to native species (DOC 2001). New Zealand also has a large number of introduced invertebrates, fungi and pathogens that have varying impacts on native biota.

The relative threats posed by vertebrates and invertebrates

Non-vertebrate new organisms undoubtedly pose the greatest threat to indigenous forests under the current biosecurity regulatory framework. The probability of new vertebrate species such as snakes or rodents being accidentally introduced and successfully establishing in New Zealand is relatively low as a result of the inspection and treatment measures implemented at the border.

Similarly the likelihood of new vertebrate pests being intentionally introduced is low as the Hazardous Substances and New Organisms Act 1996 (HSNO) administered by the Environmental Risk Management Authority (ERMA) prevents the introduction of organisms for which there may be adverse environmental effects². The risks posed by vertebrate species to conservation values are therefore greatest from those species which are already present but which may not have reached their full potential range, or from species

present as pets but which have not yet naturalised.

While the regulatory framework aims to minimise the risks posed by all new organisms the difficulties inherent in detection, identification and treatment of insects, bacteria, viruses, fungi and other pathogens mean that some will inevitably slip through the border. The threats posed by these organisms to indigenous forests are unknown and the associated risks difficult to predict. Some high profile pest species (eg Asian longhorned beetle, Asian gypsy moth, Newcastle disease) have been identified and are actively targeted in surveillance activity. High risk groups (e.g. *Lymantriidae*, *Compositae*, *Phytophthora*, *Solenopsis*) have also been identified and all incursions of these species are treated with urgency. However, for the vast majority the real risks are often not identified until after establishment has occurred and eradication is no longer feasible.

Awareness of the importance of non-mammalian pests has been steadily increasing as a result of a number of high profile incursions (eg. white spotted tussock moth, painted apple moth, varroa, tropical grass webworm) over the last few years. However, when protecting conservation values on private and public land, management of new and emerging invertebrate pests has been relatively late in coming. The majority of pest control funding on the conservation estate remains focused towards management of vertebrate pests and weeds.

The Department of Conservation currently spends approximately 25% of its total funding on pest (predominantly vertebrate) and weed control on the conservation estate. The majority of this funding (approximately 20%) is spent targeting mammalian pests such as possums, stoats, goats, thar, rabbits, and wallabies with a small proportion provided for managing other pests such as koi carp, and mosquitofish, and invertebrate pests such as wasps and argentine ants. Of the remaining funding, effort is directed to controlling a number of serious weed species such as old mans beard, wandering jew, banana passionfruit, mistflower, climbing asparagus, and Japanese honeysuckle.

With the completion of the national Biosecurity Strategy it is expected that strategic direction will be given to all of the biosecurity agencies in relation to how risks to conservation values should be managed. In the meantime the Department will continue to fund new biosecurity issues as the other agencies do, by reallocating baseline funding or by seeking additional resources from Government.

Identifying the threats to indigenous forests

When evaluating the threats posed by new organisms to indigenous forests the reality is that we don't really know what they are. So little is known about indigenous



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² Refer s 36 of the HSNO Act.

biodiversity and the role and function of each species within the wider ecosystem, that it is difficult to predict what the impacts of new introductions will be. Furthermore, evaluation of pest potential can be misleading, as not all pests are problems in their native range (e.g. painted apple moth, guava moth).

However, research contracted by the Department concluded that the principal threats in terms of pathogens and pests of native forests will come from temperate southern hemisphere countries such as Australia, South America and Africa (Ridley *et al.* 2000). These countries have floristic assemblages similar to species in New Zealand and invertebrates and pathogens from these countries are therefore more likely to be adapted to the particular characteristics of the New Zealand flora. A significant (but lesser) threat is posed by polyphagous or xenophagous insects from the Northern Hemisphere.

Ridley *et al.* (2000) identified *Chalara australis* (Myrtle wilt) and *Puccinia psudii* as examples of pathogens that have the potential to significantly affect *Nothofagus* and Myrtaceae species respectively. Sapsuckers (Hemiptera) were predicted to pose a greater risk than other plant pests due to their ability to avoid the chemical defences of most plant species by tapping directly into the sap. Parthenogenesis increases the probability of these species establishing even when founder populations are small. Species from the aphid genera *Neuquenaphis*, *Neosensoriaphis* and *Taiwanaphis* were highlighted as potential pests of *Nothofagus*. Similarly species from within the aphid genus *Neophyllaphis* were identified as potential pests of Araucariaceae and Podocarpaceae due to the absence of potential parasitoids in the native fauna.

Work has not yet been undertaken to attempt to identify the potential threats to invertebrate groups characteristic of native forests. We know from past experience that generalist predators such as the common wasp and generalist omnivores such as the Argentine ant and the snail *Oxychilus cellarius* can have significant direct and indirect detrimental impacts on invertebrate fauna. However, predicting the potential for impact of other invertebrates prior to their establishment is problematic, particularly for those without a history of invasive behaviour.

Relative to other countries, New Zealand treats biosecurity very seriously. This is a result partly of the need to protect the primary industries on which our economy depends, the desire to protect the human population from exotic diseases and parasites, and recognition that New Zealand's flora and fauna are biologically unique and therefore worth protecting.

The border management system is comprehensive. Current border inspection processes at ports, airports and the international mail centre are superior to most other countries and lead to the seizure of thousands of risk goods every year (Green 2000). The general level of public awareness relating to the risks associated with new pests and diseases has increased following the foot and mouth outbreak in the UK and the implementation of a national public awareness campaign "Protect New Zealand". Inevitably, however, a small proportion of new organisms will slip through the border unnoticed. From May 2001 to June 2002, 38 new organisms were

recorded in New Zealand.

So what do we need to do better?

Evaluation of the risks posed by new organisms to indigenous biota needs to be integrated at all levels of the border management process. This requires appropriate resourcing and direction from Government. Under the current system new organisms intercepted post border are evaluated for their potential to pose a risk to the economy. However, resources do not allow the evaluation of potential impacts to indigenous biota, except in situations where the impacts are obvious. The diagnostic facilities contracted to undertake this work are not currently funded or technically resourced to complete this type of analysis. This is particularly worrying for the fungal and nematode species that are occasionally intercepted on plant and forestry imports.

There is very little formal coordinated surveillance undertaken over areas of native habitat. Surveillance activities are targeted towards the first points of entry (i.e. areas close to ports and airports) and tend to be targeted at identifying specific economic pests such as fruit fly. The national surveillance effort requires review and redevelopment to ensure a more integrated and coordinated approach that maximises the probability of identifying new incursions as early as possible.

Research requires greater collaboration and funding. Research into the impacts of exotic species, particularly invertebrates, disease and fungi, is sorely lacking and is compromised by information gaps and poor baseline data in indigenous systems.

All of these issues (and more) were identified by Taylor (2000) and are to be addressed in the national Biosecurity Strategy³. It is hoped that most of these shortcomings will be resolved by the strategy to result in an integrated, effective and cost effective national biosecurity management system.

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³ <http://www.biostrategy.govt.nz/>