Sea Container Review

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Submissions are being sought on this Discussion Paper. A basic submission form is included in this document, after the Appendices. The deadline for submission is 28 April 2003. Submissions can be made to:

Ms Jeanette Dawson
Ministry of Agriculture and Forestry
PO Box 106231
AUCKLAND

Preface

Managing the biosecurity risks in the sea container pathway poses particular challenges. The containers are often loaded and unloaded away from ports in a large number of countries that differ widely in biosecurity risk status. Accordingly, it is often very difficult to develop definitive risk profiles that are applicable to all containers.

This review provides a sound basis from which to develop appropriate risk mitigation strategies. It also builds on the results of previous studies conducted by scientists of the former Ministry of Forestry and Crop & Food Research Ltd, and it is appropriate that I acknowledge the content development and data analysis done by Dr Carolyn Whyte and Sarah Wedde, of the MAF Biosecurity Authority, Border Management Group.

Because of extra biosecurity activities associated with the 2001 foot and mouth disease epidemic in the United Kingdom, the commencement of the review process was delayed. Staff of the MAF Quarantine Service conducted the field survey work, with valuable support from port and shipping companies.

The results of this review will provide the foundation for further enhancing the way in which risks associated with this pathway are managed. The report will no doubt be of considerable interest to other international biosecurity agencies.

It is clear that there is not a “one stop” solution to the risks posed by containers and their contents. The answer lies in implementing a range of measures, both in New Zealand and offshore. A successful implementation will involve a number of stakeholders in the cargo logistics continuum. A key principle used in developing the mitigation measures was to enable affected parties to reduce their direct and indirect costs by higher levels of compliance. They will also be provided with opportunities to propose and, if approved, introduce alternative risk mitigation steps, where these are shown to provide equivalent risk management efficacy.

To those of you who have already contributed to the process, I say thank you. Your continued assistance, by providing comments on this paper and the implementation of the new import health standard, which will ultimately flow from this process, is greatly appreciated.

Neil H Hyde
Director, Border Management Group
MAF Biosecurity Authority
Ministry of Agriculture and Forestry

March 2003

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Executive Summary

1. The number of sea containers arriving in New Zealand has increased by approximately 180 percent over the last 12 years, with over 260,000 full and 160,000 empty containers imported during 2001/02. Over 95 percent of the empty containers and 97 percent of loaded containers arrive with cleaning certificates, stating that the interior of the container is free from contamination. All of the uncertified containers are internally inspected by MAF before leaving the wharf. Of the certified containers, 10 percent are selected at random and inspected internally to verify the accuracy of the certificate. Cargo manifests are used to target containers with cargo or wood packaging material requiring inspection. Overall, approximately 24 percent of the containers imported in 2001/02 were inspected internally by MAF on arrival.

2. A survey of over 11,000 sea containers was undertaken to assess risks associated with sea containers, including: the incidence of risk cargo and packaging materials in containers; the accuracy of manifest descriptions for contents and packaging; the nature and frequency of contaminants, particularly exotic organisms, in sea containers; the movement of sea containers within New Zealand; the level of biosecurity risk posed by the sea container pathway, and effectiveness of current risk mitigation procedures.

3. Approximately 17 percent of loaded containers surveyed contained biosecurity risk cargo. Nearly half (48.5 percent) of loaded containers were estimated to have wood packaging material inside, and approximately 16 percent contained wood packaging material requiring biosecurity action, such as fumigation or incineration. Contamination, either external or internal, affects 24 percent of loaded and 19 percent of empty containers. Most contamination was found inside, rather than outside, containers.

4. Soil was the main type of external contaminant seen, and was found on an estimated 3.6 percent of loaded and 1.3 percent of empty containers. Only the four lateral sides of the survey containers were examined in most instances. Marshall and Varney (2000) found that most significant soil contamination could be detected without a six-sided inspection. However, Gadgil et al (1999) found that the majority of live organisms occurred on the undersides of containers, and so would not be seen with only a four-sided inspection. It was not thought necessary to repeat the six-sided survey, given the expense, logistical and OSH issues surrounding six-sided container inspections and the fact that external contaminants of sea containers have been well documented. However, it is clear that the risk of containers being externally contaminated will vary widely, depending on the country of origin, time of year and other factors.

5. Internal contamination affected approximately 21 percent of loaded and 18 percent of empty containers. Containers with cleaning certificates, intended to provide assurance that containers are free from internal contamination, did not have a lower contamination rate than those without cleaning certificates. However, the current requirement for cleaning certificates may be responsible for 80 percent of containers arriving in New Zealand free of internal contamination. The risk of containers being internally contaminated will vary with the country of origin of the container, time of year, previous cargoes and other factors.

6. Approximately 7.4 percent of loaded containers in the survey had unmanifested cargo (i.e. cargo not described on the manifest) found, and 1.7 percent had unmanifested biosecurity risk goods. Over 30 percent of loaded containers were estimated to have unmanifested

wood packaging material, and 8.5 percent had unmanifested wood requiring treatment or destruction.

7. Approximately 6.1 percent of loaded containers and 1.6 percent of empty containers were found with live regulated organisms inside.

8. The door inspection process is 85 percent effective at detecting wood packaging inside a container, and 72 percent effective at detecting external soil. Approximately 28 percent of the containers with wood-infesting fungi, 21 percent of those with bark, 15 percent with any contaminated wood packaging, 10 percent with internal soil and seeds and 4 percent with live insects or spiders were detected via the door inspection.

9. Trials with a portable probe camera did not appear to significantly improve detection of risk material inside containers, although wood packaging not visible by eye was seen in several containers using the camera. The format of the camera made it often awkward to use in the container inspection areas. This type of inspection equipment may be useful in special circumstances, but is not proposed for general use as a part of sea container inspections.

10. The movements of a sample of the surveyed containers were tracked throughout New Zealand, until the containers were re-exported. The tracked containers remained an average of 41 days in New Zealand. Approximately 32 percent of the tracked containers remained within the urban area surrounding the port of arrival. Some 26 percent were sent to rural areas for packing before export, while the rest (42 percent) were transported between major centres through rural areas. A number of rural areas where containers tend to remain stationary for periods of time were identified. These areas potentially at risk, as they are located some distance away from places where surveillance activities are concentrated, such as ports.

11. Risk mitigation measures were identified and evaluated. It is not likely that one single measure could adequately manage all of the risks posed by sea containers. Inspection and/or treatment of 100 percent of sea containers on arrival are not recommended as viable alternatives, nor as alternatives that would adequately mitigate all risks. Instead it is proposed that a system of multiple risk mitigation measures be integrated into the cargo logistics pathway. This system would match the level of intervention with the level of risk posed by a container, and would be designed to detect and remove contamination earlier in the pathway, keeping more of the risk offshore. A key risk mitigation measure recommended is the development of an electronic intelligence-based risk assessment system that would enable targeting of high-risk containers. This measure would be developed as a whole-of-government initiative, in conjunction with other interested government agencies, and would, where possible, leverage off the processes developed to meet the US Container Security Initiative.

12. Consultation on a revised import health standard for clearance of sea containers is underway at the same time as consultation on this discussion document.

Terminology

APHIS	Animal and Plant Health Inspection Service, US Department of Agriculture (USDA).
AQIS	Australian Quarantine Inspection Service, Agriculture, Fisheries and Forestry – Australia (AFFA).
Biosecurity clearance	A clearance under section 26 of the Biosecurity Act 1993.
CFIA	Canadian Food Inspection Agency.
Contaminant	Organic soil (not sand, gravel or road splash), fruit, seeds, plant material, wood fungi, bark, insects and other organisms (not part of the manifested cargo), animal products, wool, hair and water, which may introduce pests, diseases or unwanted species into New Zealand.
Demurrage	Detention of a cargo conveyance (in this case, a container) during loading or unloading, beyond its scheduled time of departure.
Devan	The process of fully unpacking a container's contents.
Door inspection	Visual inspection of what can be seen of the internal state of a container when the door is opened, without removing goods from the container.
Dunnage	Material (often wood) used to secure or support a commodity but which does not remain associated with the commodity (based on FAO 2002a).
Equivalence	The situation of phytosanitary measures which are not identical but have the same effect (FAO 2002a).
External inspection	Inspection of the external sides (generally 4) of a container.
FAK	Freight of all kinds – goods for multiple consignees within a single container, devanned at an off-wharf facility.
FAO	The Food and Agriculture Organization of the United Nations.
FCL	Full container load – generally a container with goods for a single consignee.
Follow-up inspection	Inspection of a container as it is being devanned
Host commodity	A type of article being moved for trade or other purpose that is capable, under natural conditions, of sustaining a specific pest (based on FAO 2002a).

IHS Import health standard – a document specifying the requirements to be met for the effective management of risks associated with the importation of risk goods (such as sea containers).

LCL Less than a container load – a container with goods consolidated for multiple consignees.

Manifest A document describing the contents of a container (cargo and packaging), the importer and/or agent, vessel and port of arrival, and in some cases, certification or treatments that have been applied to the container.

Phytosanitary measure Any legislation, regulation or official procedure having the purpose to prevent the introduction, spread and/or economic impact of regulated organisms (based on FAO 2002a).

Port of loading The port where a container was first loaded onto a vessel.

Quantum The MAF cargo clearance database (application name is Quancargo).

Regulated organism For the purposes of this review, includes all organisms not present in New Zealand (harmful or otherwise), except those for which entry approval has been granted by the Environmental Risk Management Authority (regulated under the HSNO Act 1996); and organisms that would be subject to official biosecurity measures prior to importation, upon detection at the border or if found in New Zealand (regulated under the Biosecurity Act 1993).

Risk good Any organism, organic material, substance or other thing that it is reasonable to suspect constitutes, harbours or contains an organism that may cause unwanted harm to natural and physical resources or human health in New Zealand; or that may interfere with the diagnosis, management, or treatment, in New Zealand, of pests or unwanted organisms.

Seizure A risk good that does not immediately comply with an import health standard on arrival and is either treated, destroyed, reshipped or held for further documentation or investigation.

Soil For the purposes of this review, references to “soil” indicate organic soil that may be considered a risk good (see definition of risk good above). Inorganic mineral material is not considered soil.

Slippage The entry of risk goods into New Zealand without biosecurity clearance.

Surveillance Systems for detecting exotic organisms, including formal (e.g. trapping, surveys) and informal (public hotline, submissions of unusual insects found in gardens) components. Surveillance is a post-border risk mitigation measure that reduces the risk of organisms establishing permanently in the country, although it may not reduce the risk of organisms entering the country.

SWPM	Solid wood packing material: wood packaging materials, other than loose wood material (sawdust, wood shavings), used or for use with cargo to prevent damage, including, but not limited to, crating, pallets, packing blocks, drums, cases, skids and wooden dunnage. It does not include packaging made of highly processed wood materials such as plywood, oriented strand board and particle board (USDA 2000).
Transitional facility	A facility approved by the Director-General of Agriculture and Forestry for the purpose of inspection, storage, treatment, quarantine, holding or destruction of uncleared goods.

1. Introduction

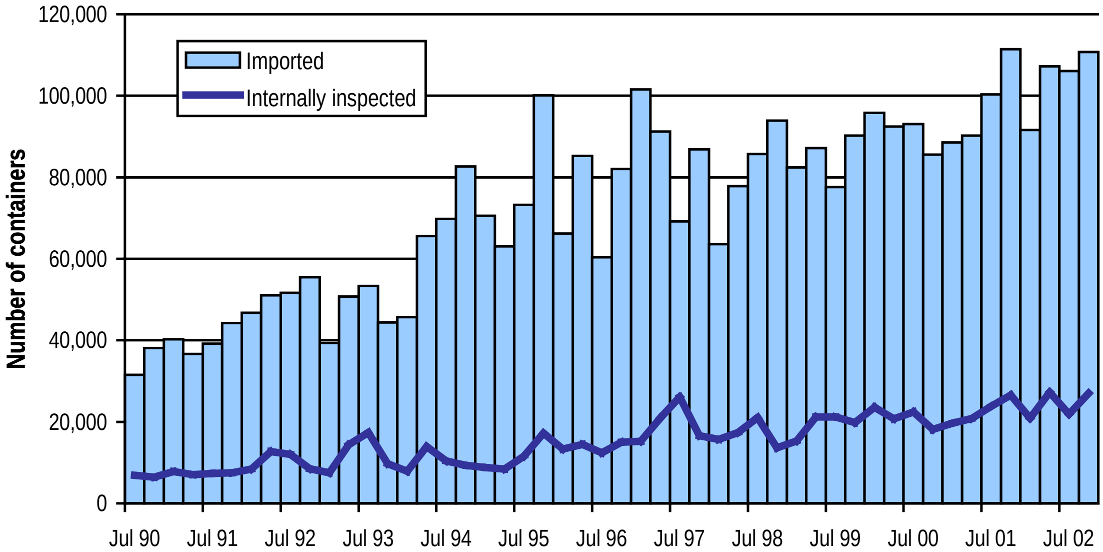
1.1 CLEARANCE OF SEA CONTAINERS AND CARGO

1.1.1 Containerisation in New Zealand

In the early 1970s, the container trade was in its infancy in New Zealand. Auckland, the largest container port in terms of throughput, had one container crane, and a vessel that could carry 2,000 containers was considered large.

Over the last 12 years, the number of containers landing in New Zealand has increased by approximately 180 percent (Figure 1), with approximately 425,000 sea containers imported into New Zealand in 2001/02. Auckland now has nine container cranes, and is a regular port of call for vessels capable of carrying over 4,000 containers. Around 33 percent of the imported containers are empty and are used for exporting cargo.

Figure 1. Sea containers landed and inspected by quarter, 1990 – 2002



The advent of containerisation has meant more cost-effective, faster shipping of cargo and offers other advantages such as security from breakage of cargo and pillaging. The container trade has resulted in some changes from a biosecurity perspective, in terms of cargo, packaging and exotic organisms. While the degree to which biosecurity risks have increased on this pathway is unknown, a number of recent incursions have been anecdotally linked to sea containers. The increasing frequency of organisms detected at ports suggests that a material increase in biosecurity risk has taken place.

Prior to containerisation, cargo was unloaded from the vessel on pallets or in crates and placed in an adjacent wharf shed awaiting Customs or MAF clearance or delivery. A manifest would be available listing all cargo to be discharged at that port. MAF staff would check the manifest and identify those items of cargo that were required inspection or other action. Cargo was laid out within the wharf shed and the inspector was usually able to easily identify the cargo of interest and inspect it. Goods that were mis-manifested or unmanifested would be on display and had a better chance of being identified than such cargo in a shipping container. With containers, the cargo, and any infested packaging, is not readily apparent until the container is unpacked. Most containers are unpacked away from the wharf area, meaning that it is no longer possible to view all cargo and packaging that is discharged from the vessel.

As well as the biosecurity risks of cargo and packaging, the interior and exterior of the container can harbour unwanted organisms. Prior to containerisation, organisms in cargo could easily spread through the hold of an entire vessel. With containerised cargo, spread of organisms between consignments is limited. However, the containers also serve to conceal the organisms, resulting in the need for internal inspection of containers. Not all containers can be inspected on arrival. For this reason MAF relies heavily on documentation such as cleaning certificates, which are intended to provide assurance that containers are free from internal contamination. Over 97 percent of loaded and 95 percent of empty containers arrive with cleaning certificates, and all those without certificates are inspected on arrival for contamination. Of the certified containers, a random sample of 10 percent per port of loading are selected from each vessel and inspected to verify the accuracy of the certificate. In addition, containers with risk packaging material such as wood or straw, or those with cargo frequently shipped with risk packaging material, are selected for inspection. Overall, 24 percent of the arriving containers were internally inspected during 2001/02 (MAF 2002 – see Figure 1). These containers represent the high-risk end of the container spectrum (e.g. containers without certification, those with wood packaging and those with cargo known to be a risk), as well as the verification sample.

The system for the biosecurity clearance of containers has altered only slightly in the past 30 years while the trade has increased dramatically. This review is designed to ensure that New Zealand receives the best possible protection from the biosecurity risks posed by the sea container pathway, and that interventions are safe, cost-effective, environmentally sound and practical.

1.1.2 Current Procedures for Clearing Containerised Cargo

Clearance of containerised sea cargo involves both clearance of any biosecurity risk cargo inside the container, and clearance of the actual containers themselves. Prior to a vessel's arrival, MAF requires the shipping company to supply a variety of documentation: a manifest that describes the cargo inside each container to be discharged at New Zealand ports; a cleaning certificate stating that the container interior has been cleaned prior to loading; and a packing declaration stating that prohibited packaging material (e.g. straw) has not been used inside the container.

Quarantine officers screen the manifest to select containers with biosecurity risk goods requiring clearance. These containers are held at a transitional facility until the correct documentation is presented to a MAF office and any further requirements, such as inspection or treatment of the goods, have been met, after which clearance for the goods is given.

Quarantine officers also use the manifest to select containers that require inspection, either external and/or internal, on the wharf. This includes all containers that are likely to have wood packaging material, containers without cleaning certificates and the 10 percent randomly-selected verification sample for containers with cleaning certificates. Containers with goods for multiple importers (e.g. FAK/LCL) are directed to MAF-approved transitional facilities for unpacking and inspection. Imported empty containers may also move directly to an approved facility for cleaning. The port company and shipping company or agent is notified of the containers to be held on the wharf for inspection. These containers are placed on the ground, the door seal broken by a stevedore, contents inspected by a Quarantine Officer from the door (often with limited visibility) and the door resealed. While the container is placed on the ground the available exterior surfaces are checked for contamination. Containers from designated high-risk areas (such as where giant African snail, *Achatina fulica*, or Asian gypsy moth, *Lymantria dispar*, are prevalent), or for which it is suspected that the underside is contaminated, are inspected on all six sides. After inspection, the container is either directed for treatment or given biosecurity clearance.

1.2 IDENTIFICATION OF RISKS POSED BY SEA CONTAINERS

1.2.1 Pest Interceptions and Outbreaks Associated with Sea Containers

International trade in host commodities is clearly a means of introducing exotic pests and diseases into new areas, and wood packaging material, commonly used inside containers to support or stabilise cargo, has also been responsible for pest outbreaks (USDA 2000). However, excluding pests travelling in host material, sea containers have been associated with the movement of a variety of pests and diseases around the world. Containers have been proposed as the most likely pathway by which painted apple moth, *Teia anartoides*, entered New Zealand, and have been suggested as a potential pathway for the entry of southern saltmarsh mosquito, *Ochlerotatus camptorhynchus*, and varroa bee mite, *Varroa jacobsoni* (OAG 2002b). Live venomous snakes, giant African snails, and viable egg masses of Asian gypsy moth have also been found in association with containers imported into New Zealand (Gadgil et al 1999, MAF records).

1.2.2 Summary of Previous Research

Biosecurity risks associated with containers have been the subject of several New Zealand studies during the last decade. In 1992, a survey of LCL cargo found that 9.1 percent of consignments had wood packaging material contaminated with insects, insect damage, bark or fungi (Bulman 1992). A subsequent survey of randomly selected FCL containers (Bulman 1999) found contaminants (bark, insects, insect damage, fungi or seeds) in 1.6 percent of the containers examined. This study found wood packaging, dunnage or wooden cargo in 43.5 percent of the containers, and demonstrated that manifest information was insufficient to accurately identify containers with wood content.

Gadgil et al (1999) examined the external surfaces of containers entering New Zealand, including the tops and undersides, and found that 39 percent of the surveyed containers showed some form of external contamination, and 23 percent had “quarantinable” contamination. Soil was the most frequent external contaminant, found on 31.2 percent of containers, and over half of the soil contamination was found on the undersides of containers. Large proportions of other external contaminants were found underneath as well, including 92 percent of insect eggs, 84 percent of larvae and pupae, and 67 percent of adult insects. Of the 3681 containers inspected, two carried egg masses of Asian gypsy moth, one of which was viable, demonstrating the potential for this pest to be introduced via containers. Soil samples were tested for the presence of pathogenic fungi and nematodes. Only 4 percent of the samples contained plant parasitic nematodes, but 83 percent of the samples yielded fungi of genera known to contain pathogenic species, such as *Fusarium*. A single fungal species such as *Fusarium oxysporum* may have many subspecies, forma speciales, varieties or races, not all of which are equally pathogenic (e.g. Larkin and Fravel 1998). As the fungi found by Gadgil et al (1999) were not all identified to species, all soil samples containing isolates of pathogenic genera were considered to be quarantinable. This resulted in considerable discussion, as many pathogenic species of *Fusarium* are present in New Zealand, and could not be considered quarantinable.

Marshall and Varney (2000) subsequently examined soil contamination on external surfaces (excluding the undersides) of containers at Auckland, finding 33.7 percent with soil or mineral contamination on the outside. Samples were categorised as to composition, with only 2.5 percent of the samples containing particulate organic material. The samples were examined for the presence of various organisms, including pathogenic fungal genera (*Pythium* and *Fusarium*) and parasitic nematodes. Four New Zealand soil samples were also examined for comparison. The container samples had a smaller number of *Pythium* species than the New Zealand samples, and a similar number of *Fusarium* species. The New Zealand samples had a wider range of parasitic nematodes than the container samples. While soil from containers was shown to carry pathogenic organisms, the authors concluded that the risk of disease establishment from chance introduction in soil was significantly lower than the risk of a specific pathogen entering in host tissue, such as dunnage or wooden packaging material.

As a follow-on study, Godfrey et al (2001) examined isolates of *Fusarium oxysporum* from the shipping container samples of Marshall and Varney (2000) as well as a large number of New Zealand soil samples. *Fusarium oxysporum* is a highly variable fungal pathogen, and genetic diversity between overseas and New Zealand isolates could result in some overseas isolates being more pathogenic in New Zealand than the local isolates, and hence, “quarantinable”. A molecular analysis showed that the container isolates were genetically different than the New Zealand isolates; however, both groups showed similar disease-causing potential. The shipping container soil was not thought to pose an immediate biosecurity risk in terms of *Fusarium oxysporum*.

A study of “high-risk[1]” FCL containers (Bulman 1998) examined the efficiency of the door inspection process for identifying forestry contaminants. The containers were door-inspected on the wharf, and then examined during the unpacking process for evidence of contamination not identified at the door inspection. Approximately 23 percent of the containers required quarantine treatment – for 80 percent of these, the contamination was identified at the door inspection. While this suggested a relatively high efficacy for door inspection, the sample was biased towards high-risk containers. This may have meant that contaminants occurred in larger quantities, were more visible, or just that the inspectors knew what to expect. Bulman noted that almost half of the contaminants that were found only during unpacking were live insects, showing the potential vulnerability of the door inspection process for detecting live organisms.

Ridley et al (2000) reviewed several pathways by which forest pathogens and pests enter New Zealand, including sea containers. Border interceptions of pests, host material and trade statistics were assessed, as well as records of new insects and fungi found in New Zealand. Pathways linking New Zealand with other Southern Hemisphere countries were identified as potentially high risk for indigenous forests, due to the faunal similarity of these countries and New Zealand.

In Australia, a survey of 3001 empty containers in storage found that 39 percent had live or dead insects inside (Stanaway et al 2001). Live insects were found inside 6 percent of the containers. Although many exotic species were identified, only one exotic insect was found alive in the containers. Insects with the potential to infest timber were found in 3.5 percent of the containers, but the timber floors of the containers did not show significant levels of damage by wood-boring insects, suggesting that timber dunnage, rather than the container floors, was the most likely source of these species.

[1] Containers surveyed were considered to be high risk for infested wood packaging material, rather than a randomly-selected sample.

Repeated finds of infested wood packaging material at inland warehouses in the USA indicate that on-wharf inspection is insufficient as risk mitigation (USDA 2000). This is due in part to a low percentage of material examined, and also because of difficulty in identifying infested material at the time of inspection. International guidelines for solid wood packaging material used in trade have been developed to mitigate the risk of transporting pests and diseases associated with wood (FAO 2002b).

1.2.3 Survey Objectives

The previous studies on container risks have concentrated on risks to forests, particularly those associated with wood packaging and external container contamination. The review's multi-disciplinary, inter-agency project team designed the current survey to assess the likelihood of uncleared biosecurity risk goods (cargo, packaging and contaminants) passing through the border, and to identify the types of contaminants present. This included assessing the incidence of risk material in containers, the ability to identify containers requiring inspection or goods clearance (based on manifest accuracy), the effectiveness of current risk management techniques, including cleaning certificates and on-wharf inspections, and the movement of containers around the country. Note that this is a border pathway risk assessment, rather than an assessment of the risks of the individual commodities and pests associated with the pathway. Individual import health standards administered by other groups in MAF cover commodities such as fresh produce and wood packaging material. The MAF Border Management Group administers the import health standard for the sea containers, and also the operations to detect and mitigate risks associated with material covered by other standards.

The specific objectives of this survey were to:

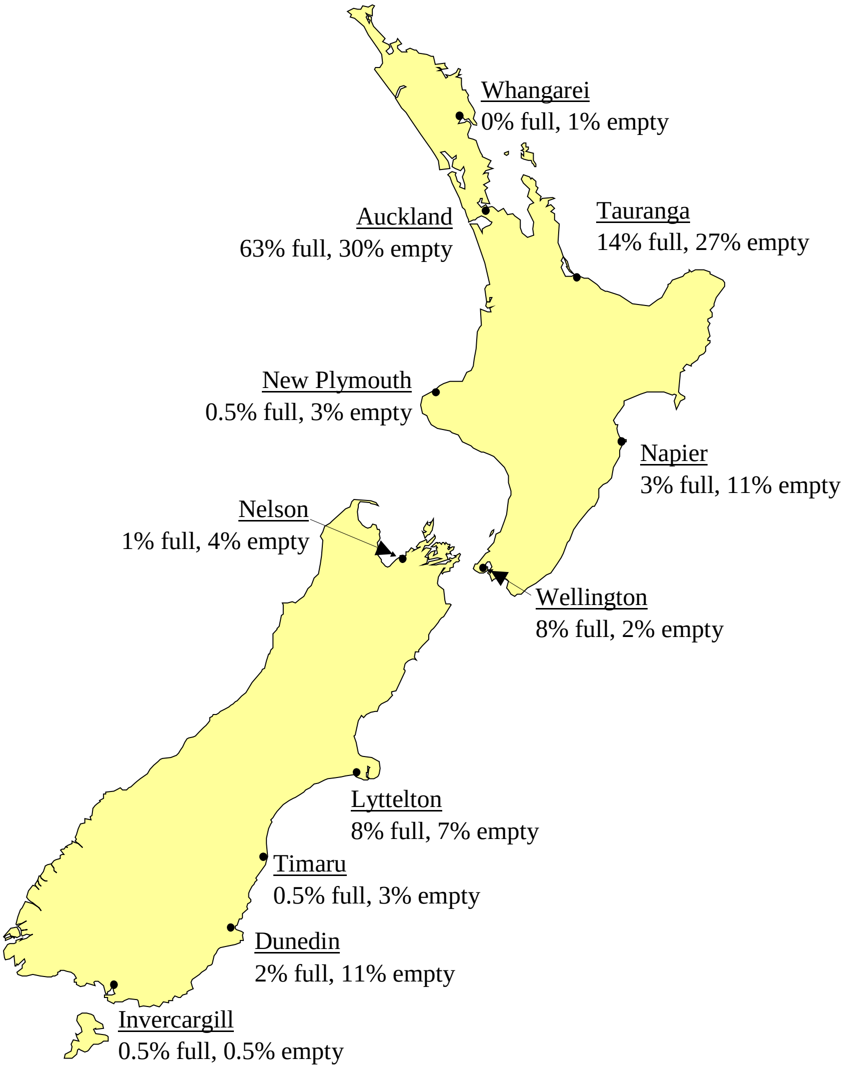
- verify the accuracy of the manifested contents and packaging descriptions;
- find out the nature of sea container contaminants;
- ascertain the true internal contamination rate for both certified (with cleaning certificates) and uncertified sea containers entering the country;
- determine the efficacy of the current on-wharf inspection methods for detecting risk material in or on imported sea containers;
- investigate the costs and benefits of using a portable probe camera to inspect containers on the wharf;
- ascertain the movements of sea containers in New Zealand;
- quantify the biosecurity risk posed by the sea container pathway, and the level of risk mitigation offered by current biosecurity clearance procedures.

2. Methods

2.1 SURVEY PORTS AND CONTAINER NUMBERS

Auckland, Tauranga, Napier and Lyttelton were chosen as survey ports, based on partly on the number of containers handled (83 percent of the national total for 2001/02), and to ensure a regional distribution to the results (see Figure 2: note that percentages do not add to 100 percent due to rounding). The containers randomly selected for the survey were used to fulfil the normal random container selection requirements, in order to minimise disruption to importers and port companies.

Figure 2. Percentage of containers imported by port, 2001/02



The desired sample sizes for the survey were set at a total of 12,000 loaded containers and 1,500 empty containers. The target for loaded containers was set at approximately 5 percent of the number of containers landed at the survey ports in 2000/01, and for empty containers, approximately 2 percent of landed containers. Empty containers were not surveyed at Napier, as all are automatically sent to a container washing facility upon arrival. At Tauranga, a very high percentage of empty containers are automatically sent to such a facility as well; the survey target was set at 10 percent of the unwashed containers. Table 1 shows the target numbers of survey containers.

Table 1. Target numbers of containers for survey

	Auckland	Tauranga	Napier	Lyttelton	Total
Loaded	8,595	1,810	469	1,126	12,000
Empty	650	10% of unwashed	0	130	Up to 1,500
Total	9,245	1,810 plus empties	469	1256	Up to 13,500

2.2 CONTAINER SELECTION PROCEDURES

2.2.1 Inspections on the Wharf

Loaded containers to be surveyed were selected from shipping manifests using a random numbers table, at a rate of 1 in 20 containers landed or a minimum of one per vessel. The random sample was taken across all manifests and container types, except as mentioned below. After the survey sample was drawn, any additional containers requiring inspection based on profiling or for verifying cleaning certificates were selected (see section 4.1.2). Tank containers were excluded from the survey, as these are relatively few in number, tend to carry specialised non-risk cargo such as bulk liquid chemicals, and are logistically difficult to inspect. Empty containers were selected in a similar way, at a rate of 1 in 50 landed or a minimum of one per vessel.

All survey containers were detained for inspection on the wharf, with these exceptions:

- Refrigerated containers (chilled or frozen goods): all inspections were done at the time of the regular MAF contents inspection, or at the unloading premises if the contents were not inspected by MAF.
- Bulk grain, hazardous goods and mail: all inspections were done at the unloading premises, not on the wharf.
- Used tyres: all inspections were done at the unloading premises, after container has been fumigated and vented.

All container inspections were performed by warranted officers of MAF Quarantine Service. These officers undergo ongoing training programmes designed to ensure that all officers achieve consistency in biosecurity decision-making.

The inspection on the wharf consisted of an examination of all accessible exterior sides, generally four (the external inspection), and internal inspection from the open door of the container (the door inspection), as performed during normal operational biosecurity inspections. The tops and undersides of containers were not examined except where part of specific operations (e.g. for containers from certain countries where giant African snail is present). Organisms (live, or dead and in good condition), seeds or plant material in or on the container were collected when found and sent to the designated laboratory for identification. Exceptions included common grains and seeds (e.g. barley, lentils, maize and wheat), which the inspectors recorded but did not send away for identification unless fungal disease symptoms were also present. Samples were held in secure containers in a refrigerator until they were sent to the laboratory, to prevent deterioration. Soil samples were not sent to a lab for fungal or nematode analysis, as the fungi and nematodes associated with soil on containers imported into New Zealand have been well documented by Gadgil et al (1999) and Marshall & Varney (2000).

A portable camera, having a lens at the end of a long pole, attached to a colour LCD screen held by the operator, was tested at each port. For containers where the camera was used, the surveyor first visually inspected the container, recording any contaminants or other risk material seen, and then used the camera to inspect the further recesses of the container where visibility was restricted. Any additional contaminants or risk material seen with the camera was then recorded. Originally, the camera was to have been tested only at Auckland on approximately 1000 containers; however, the close spacing of containers in the inspection yard prevented the camera's use in many instances, and so the camera was tested at each survey port for several months, where feasible to do so.

2.2.2 Follow-Up Inspections

In order to check the effectiveness of the wharf inspection, and to verify the accuracy of the manifest description of the contents and packaging, one out of every 6 loaded survey containers was selected for a follow-up inspection. Wherever possible, follow-up containers were selected so that the quarantine officer doing the wharf inspection was unaware of which containers were to be followed up, to avoid the possibility of bias in the results. After selection, the follow-up inspector contacted the shipping agent to determine the devanning address and time.

At the follow-up inspection, the inspector arrived prior to the start of devanning, and observed the entire unloading process. In some cases, the container was unloaded a little at a time over several days, requiring the inspector to make multiple trips. At the follow-up inspection, the container's cargo, packaging and cleanliness were checked as the container was devanned. After the inspection, the inspector recorded information about the contents and packaging, and any contamination found inside the unpacked container. Table 2 lists the target number of containers to be followed up at each survey port.

Table 2. Target numbers of loaded containers for follow-up survey

	Auckland	Tauranga	Napier	Lyttelton	Total
Follow-up survey	1,432	302	78	188	2,000

2.2.3 Container Movement Survey

Every second follow-up container was selected for a movement information survey. For this survey, the shipping company responsible for the container was contacted and asked to provide information on each location to which the container was sent in New Zealand: the devanning site, empty container storage site, container packing site, and port of export. The type of surface at each site (sealed or unsealed), the mode of transport between sites and the overseas destination of the container was also recorded. Table 3 lists the target number of containers for the movement information survey by port.

Table 3. Target number of loaded containers for movement survey

	Auckland	Tauranga	Napier	Lyttelton	Total
Movement survey	716	151	39	94	1,000

2.2.4 FAK Screening Survey

In order to add to the value of the survey regarding FAK consignments, quarantine officers at a large transitional facility in Auckland recorded each FAK consignment cleared during the year, the number of consignments with extra (unmanifested) lines and whether any lines from the consignments were held for quarantine reasons. No target numbers were set: the quarantine officers recorded the information for each FAK container unpacked.

3. Results

3.1 SAMPLE DESCRIPTION

Table 4 shows the number of containers surveyed at each port by mode of shipment (FCL, LCL and empty), and the total number of containers landed during 2001/02 at that port (FCL and empty containers only[2]). The percentage of imported containers surveyed is shown in parentheses. This does not include the FAK containers mentioned in 5.2.4.

Table 4. Containers surveyed by port and shipping mode

Port	FCL		LCL	Empty		Total surveyed
	surveyed	imported (%)	surveyed	surveyed	imported (%)	
Auckland	6,708	157,989 (4.2%)	254	443	48,506 (0.9%)	7,405
Tauranga	1,457	34,636 (4.2%)	42	325	43,906 (0.7%)	1,824
Napier	371	7,978 (4.7%)	2	-	-	3,723
Lyttelton	1,494	20,580 (7.3%)	17	152	10,758 (1.4%)	1,663
Total	10,030	221,183 (4.5%)	315	920	103,170 (0.9%)	11,265

The percentage of total FCL containers selected at the four ports was slightly less than the 5 percent target, with Lyttelton selecting over 7 percent, and the rest selecting 4.2 – 4.6 percent. Empty container selection was well under the 2 percent target at all ports. At Tauranga, a greater than expected percentage of empty containers were sent straight to the container wash facility, so the 10 percent random sample of the remaining containers was increased partway through the survey.

Table 5 shows the number of containers selected by type and length. “General” indicates the standard, 6-sided shipping container without refrigeration unit, either ventilated or unventilated. Bulk containers are 6-sided boxes that have been adapted to carry loose cargo such as wheat or rice. Flat rack containers have a solid platform base on which cargo is secured, and may have fixed ends, fixed corner posts or collapsible ends. Hazardous containers are those with hazardous contents, although the type of container is often general. Open containers have either open sides or an open top, covered by removable canvas. Although tank containers were excluded from the survey, a few such containers were selected: these containers consist of a tank for carrying liquid, enclosed in a frame. “Reefer” indicates a container with a refrigeration unit, although reefer containers may be used, unrefrigerated, for general cargo. In some cases, the length and/or type of container was determined from the type code entered on the survey form (e.g. 4333 indicates a 40-foot container with integral refrigeration unit). In other cases, the length and/or type of container could not be determined (“unspecified” in the table).

[2] The volume of LCL cargo is currently recorded for statistical purposes, rather than the number of containers imported. LCL containers represent approximately 5 percent of the total number of containers imported.

Table 5. Containers surveyed by type and length

	20-foot	40-foot	Unspecified	Total
Bulk	83	0	0	83 (0.7%)
Flat rack	127	53	3	183 (1.6%)
General	7,037	2,652	27	9,716 (86.2%)
Hazardous	45	13	0	58 (0.5%)
Open	136	67	1	204 (1.8%)
Reefer	472	142	3	617 (5.5%)
Tank	3	0	0	3 (0.0%)
Unspecified	227	102	72	401 (3.6%)
Total	8,130	3,029	106	11,265 (100.0%)

Table 6 shows the country or region of origin of the contents of the loaded containers surveyed by each port. This information is not always provided on manifests, and so could not be determined for a number of containers ("unspecified" in the table).

Table 6. Place of contents origin for loaded containers

	Auckland	Tauranga	Napier	Lyttelton	Total
Australia	1,581	816	126	644	3,167 (30.6%)
People's Republic of China	824	222	38	155	1,239 (12.0%)
USA & Canada	469	251	23	37	780 (7.5%)
Singapore	263	6	13	74	356 (3.4%)
Europe (other)	248	5	38	49	340 (3.3%)
Republic of Korea	211	14	13	80	318 (3.1%)
Thailand	225	6	12	52	295 (2.9%)
Malaysia	196	20	5	49	270 (2.6%)
Japan	183	11	6	67	267 (2.6%)
Indonesia	189	8	11	52	260 (2.5%)
Germany	199	2	19	32	252 (2.4%)
Asia (other)	172	13	9	49	243 (2.3%)
Other (CSA, Africa)	174	13	12	28	227 (2.2%)
United Kingdom	149	7	15	31	202 (2.0%)
Italy	159	4	8	23	194 (1.9%)
Taiwan	124	18	4	30	176 (1.7%)
Middle East	147	0	3	11	161 (1.6%)
Netherlands	112	5	7	32	156 (1.5%)
Pacific Islands	56	9	1	2	68 (0.7%)
Unspecified	1,282	68	10	14	1,374 (13.3%)
Total	6,963	1,498	373	1,511	10,345 (100.0%)

Australia is the major source country for goods entering New Zealand via containers at all four of the surveyed ports, followed by China and the USA (6.5 percent excluding Canada). Other countries each represented less than 5 percent of the total.

Table 7 shows the number of empty containers imported by place of loading. Again, this was not specified for all empty containers. Nearly half of the empty containers arriving in New Zealand at the survey ports were from the Pacific Islands. This varied by port, with 52 percent of empty containers at Auckland, 51 percent at Tauranga and 16 percent at Lyttelton coming from the Pacific Islands. Papua New Guinea was the country supplying the most empty containers, at 147 (16 percent of the total). The high proportion of empty containers from the Pacific Islands may be due to New Zealand being one of the closest places where empty containers from Pacific Island countries can be landed to pick up new cargo.

Table 7. Empty containers by place of loading

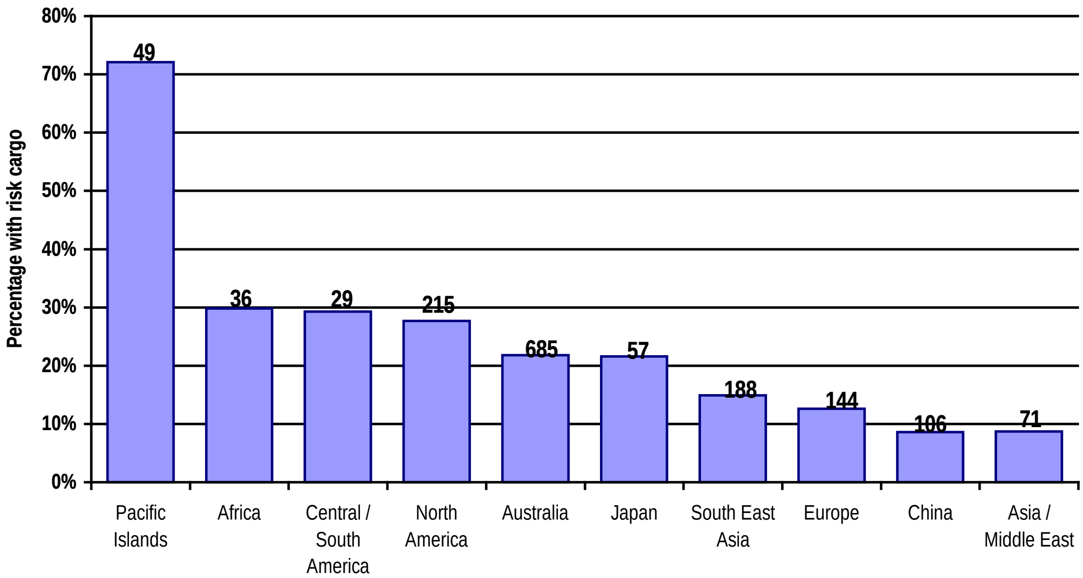
	Auckland	Tauranga	Lyttelton	Total
Pacific Islands	231	165	25	421 (45.8%)
Australia	44	26	38	108 (11.7%)
Southeast Asia	10	23	44	77 (8.4%)
North America	68	5	0	73 (7.9%)
Asia/Middle East	15	18	28	61 (6.6%)
Japan	21	14	16	51 (5.5%)
Central and South America	31	3	0	34 (3.7%)
Europe	9	0	0	9 (1.0%)
Unspecified	14	71	1	86 (9.3%)
Total	443	325	152	920 (100.0%)

3.2 INCIDENCE OF RISK MATERIAL IN CONTAINERS

3.2.1 Cargo

Of 10,285[3] loaded containers door-inspected on the wharf or at a transitional facility, 1,502 (14.6 percent) were found with biosecurity risk cargo[4] at the door inspection. Of those without risk cargo seen, 1,213 were followed up, of which 32 (2.6 percent) contained risk cargo. Overall, approximately 17 percent of loaded containers surveyed contained biosecurity risk cargo, ranging from 9 percent for containers with contents from China, the rest of Asia and the Middle East to 72 percent for containers with contents from the Pacific Islands (Figure 3). Numbers above each bar indicate the estimated number of containers from each origin with biosecurity risk cargo.

Figure 3. Incidence of risk cargo in loaded containers by place of content origin



Various types of foodstuffs were the most common risk goods found, followed by used vehicles, machinery and other equipment, pet food, grain and timber. Although only 22 percent of Australian containers had risk cargo (Figure 3), Australia was the largest source of risk goods found, accounting for around 40 percent (mainly foodstuffs and pet food).

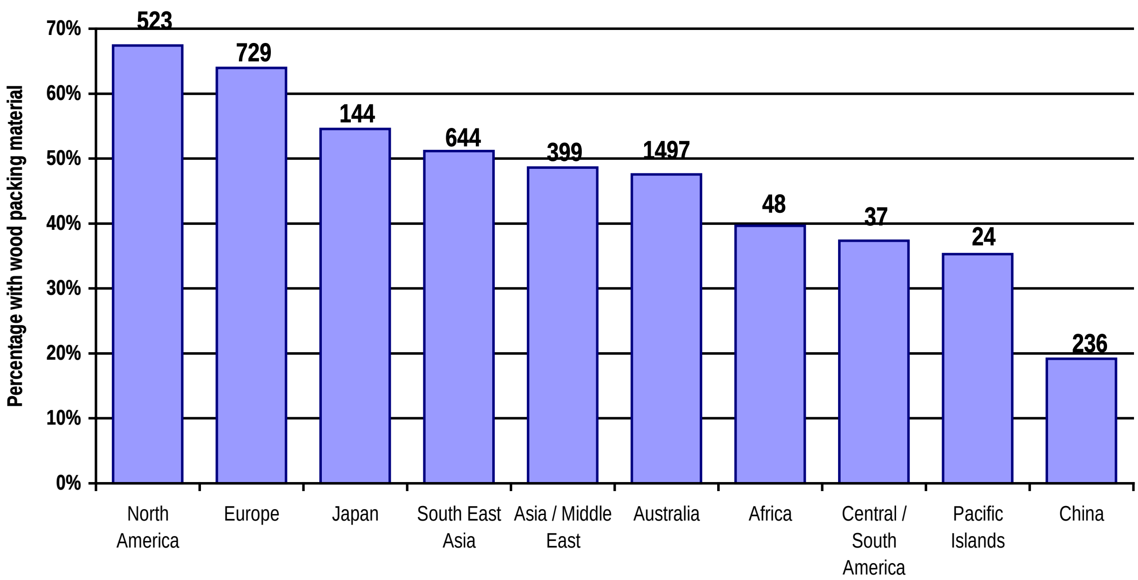
[3] Excludes a few containers for which the door inspection was missed: other information (such as a follow-up inspection or tracking information) was provided for these containers, so they were included in some analyses where appropriate.
[4] Includes manifested and unmanifested risk cargo: the vast majority of these would have been cleared through normal cargo operations

Approximately 14 percent of the risk cargo in the surveyed containers did not comply with relevant import health standards on arrival and were seized. Vehicles and machinery accounted for 33 percent of product seizures[5], with nearly 29 percent of all vehicles intercepted requiring treatment. Caneware and used tyres, both of which require mandatory fumigation on arrival, accounted for another 24 percent of seizures. Food products accounted for 12 percent, and timber, wood and handicrafts (often wood) made up 8 percent. Further analysis on the risks associated with individual commodities, countries and importers will occur as part of the ongoing development of more comprehensive container risk profiles.

3.2.2 Wood Packaging Material

At the door inspection, 4,294 of the 10,285 loaded containers were found with wood packaging material[6]. Of those that had no wood found at the door inspection, 859 were followed up, of which 102 had wood seen during the follow-up inspection. In total, nearly half of the loaded containers (48.7 percent) contained wood packaging material. The USDA has estimated that a similar percentage (51.8 percent in 2000, 51.6 percent in 2001-02) of maritime shipments to the USA include solid wood packaging material (USDA 2000, R. Komsa, pers. comm.). Figure 4 shows the incidence of wood packaging material in the loaded survey containers by place of content origin. Numbers above the bars indicate the estimated number of containers with wood packaging material from each origin.

Figure 4. Incidence of wood packaging material by place of contents origin



The incidence of wood packaging material in containers from China (19 percent) was substantially less than from other major sources such as Australia (48 percent), North America (67 percent), Germany (75 percent), the UK (60 percent), Singapore (59 percent) and Korea (51 percent). China may have reduced the use of wood packaging as a result of US regulations requiring treatment and certification of wood packaging material from China (USDA 1999), following the outbreak of Asian longhorned beetle (*Anoplophora glabripennis*) in the USA. Data from the USDA also indicates that the percentage of shipments from China with wood packaging has dropped since the regulations were

[5] Excluding risk cargo held for documentation to arrive and then released without treatment
[6] Excludes timber or wooden objects carried as cargo and highly processed packaging of wooden origin such as plywood or particle board

introduced, although the percentage of shipments to the USA with wood in 2001-02, at 33 percent, is greater than what was found in this survey (R. Komsa, pers. comm.).

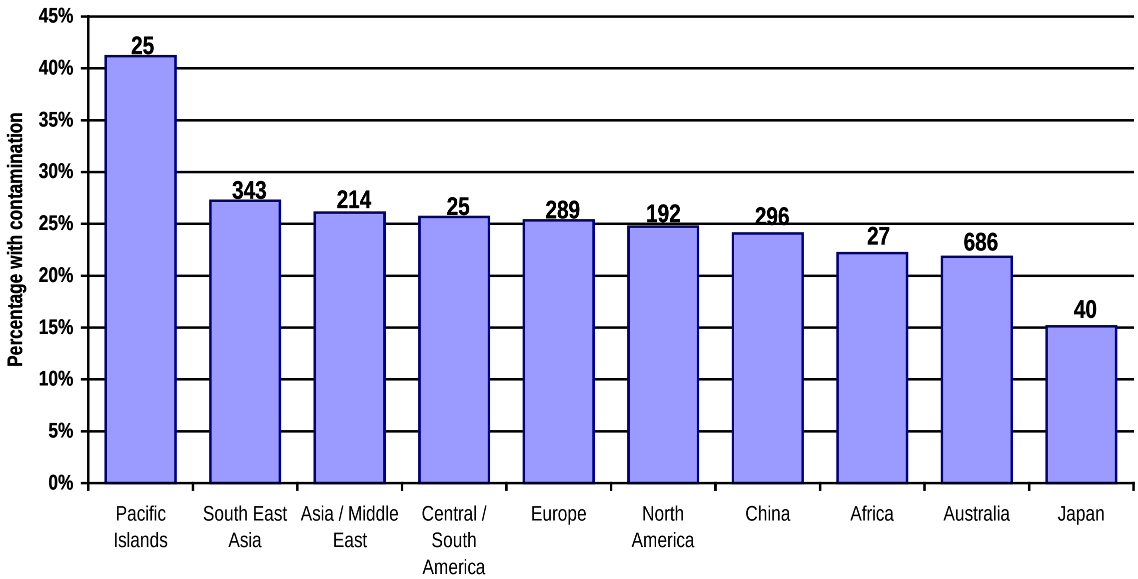
FAK containers and containers with manifests such as "general goods" (often indicating FAK) had a higher incidence of wood packaging material than other loaded containers. Of the FAK containers, an estimated 63 percent contained wood, while 48 percent of other loaded containers had wood packaging or dunnage.

Not all of the wood packaging and dunnage found was deemed to represent a risk according to the criteria of the MAF Forest Biosecurity group. A total of 1,517 containers were inspected during devanning, of which 237 (15.6 percent) had contamination found that required biosecurity action to be taken on wood packaging material, including fumigation, incineration or removal of contaminant material[7] by hand. Note that detection of contaminated wood packaging was significantly less for containers that were only door-inspected: of the 8,827 containers that were door inspected but not followed up, contaminated wood packaging material was found in only 293 (3.3 percent). The efficacy of the door inspection process at finding risk material is covered in section 6.6.

3.2.3 Contamination

Of the 10,285 loaded containers door inspected, 467 (4.5 percent) had some form of contamination[8] found at the door inspection, either internally or externally. Of the 1,385 containers that did not have contamination found at the door inspection and were followed up, 287 (20.7 percent) were found with either internal or external contamination. This gives an estimate of 24.4 percent for the overall contamination rate. This ranged from 41 percent for containers with contents from the Pacific Islands to 15 percent for those with contents from Japan (Figure 5). Numbers above the bars indicate the estimated number of contaminated containers by origin.

Figure 5. Incidence of contamination in loaded containers by content origin



Contamination rates were somewhat lower for empty containers: of the 920 empty containers

[7] Including seeds, bark, fungi, plant material, animal products and live organisms found on the packaging or dunnage
[8] Includes live organisms, soil, seeds and other material not associated with the cargo or packaging, and ranged from minor amounts that the inspector removed by hand to significant contamination that required treatment. Inorganic dirt has been excluded.

inspected, contamination was recorded for 174 (18.9 percent). By region or country of loading, this ranged from 22 percent for containers loaded at ports in the Pacific Islands to 4 percent for containers from ports in Asia and the Middle East, including China (Figure 6). Numbers above the bars indicate the number of contaminated empty containers found (note that the place of loading was not recorded for all containers).

Figure 6. Incidence of contamination in empty containers by region of loading

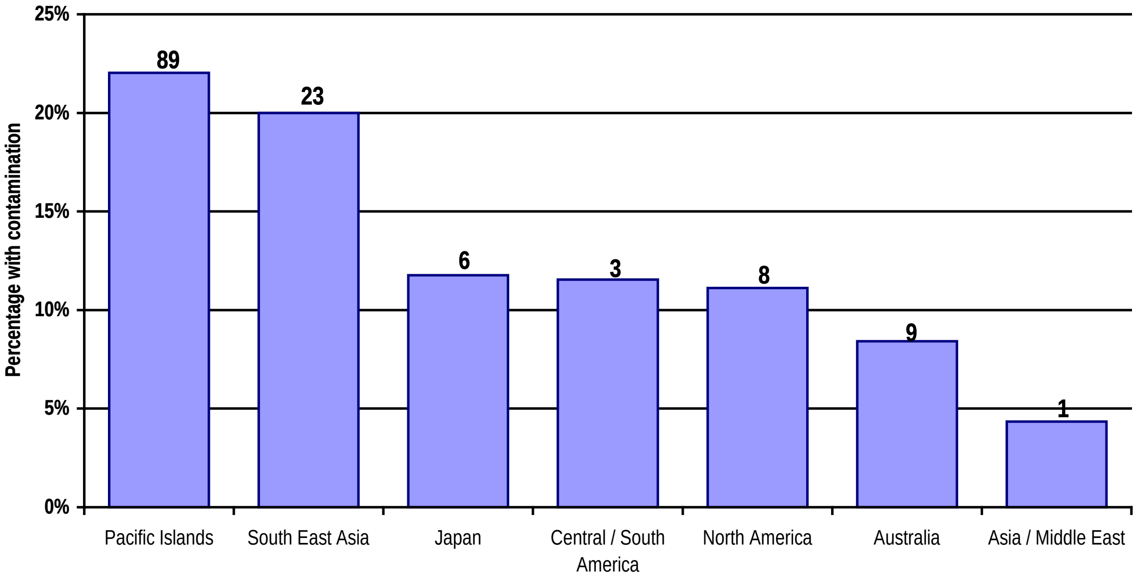


Table 8 shows the percentage of loaded and empty containers with various types of contamination. Some containers had more than one type of contaminant, so the totals are less than the sum of the individual percentages.

Table 8. Incidence of contaminants by container type

	Loaded containers			Empty containers		
	Internal	External[9]	Total	Internal	External	Total
Soil[10]	0.8%	3.6%	4.4%	1.3%	1.3%	2.6%
Seeds	6.7%	0.2%	6.8%	4.1%	0.0%	4.1%
Live insects	4.0%	0.1%	4.1%	3.5%	0.1%	3.6%
Live spiders	5.2%	0.2%	5.3%	6.1%	0.0%	6.1%
Plant material	6.3%	0.4%	6.7%	6.5%	0.1%	6.6%
Any contaminant	21.0%	4.4%	24.3%	17.7%	2.0%	18.9%

Soil was the main type of external contaminant found in the survey. External soil occurred on an estimated 3.4 percent of the loaded containers at Auckland, 1.9 percent of those at Tauranga, 1.3 percent of those at Napier and 6.5 percent of those at Lyttelton. Only 12 (1.3 percent) of the 920 empty containers were found to have external soil (1.1 percent for Auckland, 1.5 percent for Tauranga and 1.3 percent for Lyttelton).

[9] Only the 4 lateral sides were examined for most containers: a 6-sided survey (Gadgil et al 1999) showed greater levels of external contamination than those shown here, but the contaminants recorded included inorganic mineral material.
[10] The survey form specified that officers were to record "quarantine contaminants", and most soil contaminants were recorded as either "soil" or "organic soil". A few contaminants recorded as dirt or inorganic material have been excluded from the analysis.

In comparison, Gadgil et al (1999) found “soil” (including inorganic material) on the external surfaces of 31 percent of surveyed loaded containers. All six sides of the containers were examined: soil was most commonly intercepted on the bottom of the container (58 percent of the soil contaminants were located underneath the containers, and 71 percent of the contaminated containers had soil found on the bottom). Excluding containers where soil was found only on the top or bottom, 7.6 percent of Gadgil’s containers had external soil contamination, still nearly twice the rate found in the current survey. This discrepancy is likely due to the wider definition of “soil” used by Gadgil et al (1999).

Marshall and Varney (2000) found nearly 34 percent of containers to have external soil without examining the tops and undersides of all containers: they found that the external base of a container (the “rail”), visible as a container sits on the wharf, was a good indicator of the presence of soil on the underside, and concluded that a four-sided inspection did not significantly reduce detection rates for soil. Again, the material collected as “soil” by Marshall and Varney included inorganic material. In the current survey, nearly 15 percent of external soil contaminants were found on the undersides, where examined. Another 39 percent were found on the external rails or base (not the underside), and 44 percent on the lateral sides (including the door and end). Approximately 1 percent were found on the tops of containers and 1 percent in the corners.

As noted the discrepancy in soil contamination rate between this survey and previous studies may be a function of what types of contamination are considered “soil”, and the very low quantities involved in most instances. Gadgil et al (1999) sampled both organic soil and mineral contaminants (except stone chips) found on the external surfaces of containers. Out of 1,150 containers with “soil”, 63 percent had less than 50 grams found. Similarly, while Marshall and Varney (2000) found nearly 34 percent of containers had soil or mineral contaminants, the sample weight averaged 98 grams, and only 2.5 percent of the samples contained particulate organic matter. This would equate to around 0.8 percent of containers with organic soil.

In the current survey, 23 percent of the soil contaminants were expressly recorded as “organic soil”. The remaining soil contaminants were simply recorded as “soil” or soil in combination with other types of material. The survey form specified that quarantine contaminants were to be recorded, although it was left to the inspectors to determine which contaminants posed a biosecurity risk. A few records of inorganic dirt, or minimal road splash that did not warrant biosecurity action, were excluded from the analysis. The lower percentage of containers with soil contamination found in this survey may be due to a greater focus on organic soil, rather than inorganic dirt, road splash or dust that would not be considered as posing sufficient risk to warrant biosecurity action.

Live organisms (excluding fungi) were only found on the exteriors of 6 containers. In three of these cases, organisms present in New Zealand (a moth and two spiders) were found at follow-up inspections: it is possible that these were New Zealand organisms that became associated with the containers after arrival. In the other three cases, an insect present in New Zealand, a spider of a genus present in New Zealand and a spider egg sac of a family present in New Zealand were found at door inspections. Further analysis of data from Gadgil et al (1999) also shows a very low incidence of external live organisms (0.7 percent of containers), most of which were not considered to be of quarantine significance. Only 3 (0.1 percent) of the 3681 containers surveyed by Gadgil et al (1999) had live regulated organisms found on the outside (1 with an egg mass of Asian gypsy moth and 2 with redback spiders), but all of those were found on the undersides of the containers. The incidence of all live organisms on the lateral sides was approximately 0.1 percent, similar to what was found in the current survey (Table 8). Although high-profile organisms such as snakes, Asian gypsy moth and giant African snail are known to travel on or in the external surfaces of containers, the percentage of containers with such organisms appears to be extremely low.

Although soil samples were not sent for fungal culture in most cases, samples from eight containers were sent to the laboratory. These containers were not selected at random, and so the results are merely illustrative, rather than indicative. From the eight containers, 60 fungal specimens were isolated, representing 47 species. Six containers had regulated species of fungi. Of the 47 species found from soil, 11 were regulated.

3.3 MANIFEST ACCURACY

Manifest screening is the main method of identifying containers with either goods or packaging that may represent a biosecurity risk. The accuracy of the manifest descriptions for cargo and packaging directly influence the effectiveness of the cargo and container clearance processes. The two processes are separate, but related. Containers with cargo requiring biosecurity clearance are held either on the wharf or at an appropriate transitional facility until import requirements are met and biosecurity clearance is given. These containers are not normally inspected on the wharf, unless they are suspected to contain risk packaging material, have no cleaning certificate, or are part of the 10 percent random sample of containers inspected to verify the accuracy of cleaning certificates. The possibility of concealment of goods requiring biosecurity clearance is a risk associated with sea containers, and so the accuracy of the cargo manifests was investigated as part of the survey.

Containers with wood packaging indicated on the manifest, or those with cargo frequently shipped with wood packaging, are inspected on the wharf. As many of these containers are selected based on cargo profiles, rather than on manifest information, the degree to which manifests identify wood packaging inside containers was investigated as part of the survey.

3.3.1 Cargo

Of the 10,248 loaded containers that were door inspected[11], 787 were manifested as FAK, personal effects, or had unspecific descriptions such as “general goods”, “consolidation”, “mixed commodities”, “various goods”, which made it often impossible for the officers to determine whether unmanifested cargo was present at a door inspection. Although a number of these containers came with cargo description lists, the presence or absence of such lists was not always mentioned on the survey form, and some quarantine officers estimate that up to 90 percent of such containers do not arrive with detailed contents lists. Most of these containers are automatically sent for devanning under MAF supervision at a transitional facility, and so they have been analysed separately.

Of the 9,461 loaded containers that were door inspected and had more specific manifest information, unmanifested cargo was seen at the door inspection in 230 (2.4 percent) cases. Of those containers where no unmanifested cargo was seen at the door inspection, 1,320 were followed up, and 58 (4.4 percent) had unmanifested cargo seen during the follow-up inspection. Furthermore, 9 (0.7 percent) of the 1,262 containers for which no unmanifested cargo was seen during either inspection had clearance records in Quantum[12] for the unmanifested goods (e.g. clearance had been obtained by the importer for the goods). Overall, the inspection results indicate that approximately 7.4 percent of loaded containers may

[11] Excludes containers for which the question “Were contents seen visually as manifested?” was not answered, and containers for which the door inspection was missed.
[12] The MAF risk cargo clearance database

contain goods that are not indicated on the manifest (excluding FAK and "general" cargo-type descriptions)[13]. The lower and upper bounds of the 95 percent confidence interval for this figure are approximately 6.3 percent and 8.7 percent, respectively.

Most of the unmanifested cargo seen did not represent a biosecurity risk. Examples include tissues manifested as reels of paper, refrigeration equipment manifested as wheels, clothing manifested as plastic toys, and wine manifested as jack mackerel. In some cases, additional items other than the manifested contents were seen (for example, a container of margarine bases and lids also contained reels of plastic). These were referred to the New Zealand Customs Service.

Of the 230 containers with unmanifested cargo seen at the door inspection, 35 contained unmanifested cargo given biosecurity clearance[14]. In some cases, biosecurity risk goods were mis-manifested as a similar type of risk good (e.g. lemons manifested as tangerines, and tomatoes manifested as melons) that would have been stopped by MAF anyway. In other cases, the risk goods were manifested as non-risk items. Examples include milk products manifested as confectionery, a wooden pipe manifested as steel, and grain in a container of FAK manifested as cosmetics.

Of the 9,426 containers without unmanifested risk cargo seen at the door inspection, 1,348 were followed up. Of these, 9 containers had unmanifested risk goods seen during the follow-up inspection. Of the remainder, 9 had unmanifested risk goods recorded in Quantum. Overall, approximately 1.7 percent of the containers would have contained unmanifested biosecurity risk goods, with 95 percent confidence limits of 1.1 – 2.4 percent.

Many of the unmanifested cargo with biosecurity clearance did not involve high-risk goods or non-conformances (e.g. the products were released, based on documentation). There were 21 surveyed containers (excluding FAK, etc.) with unmanifested risk goods that were seized (e.g. held for documentation, treated, reshipped or destroyed). Of these, the unmanifested risk goods were seen at the door inspection in 6 cases. In one case, the unmanifested goods were seen at the follow-up inspection, and in the remaining cases, the unmanifested goods were entered into Quantum[15], but not seen in the survey. The percentage of containers with non-conforming unmanifested risk goods is estimated to be around 0.2 percent.

3.3.2 FAK and General Cargo

Without exact lists of contents for all of the FAK, personal effects and containers with "general cargo"-type manifests, it would be impossible to determine the percentage that had unmanifested goods seen at the time of the door inspection. However, during the year, Quarantine Officers at a transitional facility in Auckland unpacked 6,302 FAK consignments and recorded instances where unmanifested cargo was found. Of these consignments, 498 (7.9 percent) had additional cargo lines that were not included on the manifest. This is similar to the 7.4 percent estimated for containers with more specific manifests. Some FAK

[13] This is calculated as: 230 containers seen with unmanifested goods at door inspection, plus 4.4 percent of followed-up containers with unmanifested goods seen × 9231 containers where no unmanifested goods seen at door inspection, plus 0.7 percent of followed-up containers with no unmanifested goods seen but with unmanifested goods in Quantum × 95.6 percent of followed-up containers with no unmanifested goods seen × 9231 containers with no unmanifested goods seen at door inspection. The estimated confidence limits were derived by modelling the percentages with beta distributions using @RISK (Palisade Corporation, 2000).

[14] This includes items for which biosecurity clearance was given without need for inspection (e.g. low-risk foodstuffs and agricultural compounds), as well as items for which a commodity check or inspection was required. It excludes wood packaging, which is covered in section 6.2.3.

[15] Some of these containers would have been stopped normally for other manifested risk goods; others would have been directed for inspection and subsequent action due to the importers' agents requesting clearance for the goods.

consignments had multiple lines not manifested: out of 749 unmanifested lines, 500 (66.7 percent) were held for documentation or quarantine reasons. The remaining 249 lines were cleared at the time of unpacking.

3.3.3 Wood Packaging and Dunnage

A large number of loaded containers contained packaging materials that was inconsistent with the manifest description (e.g. 3,126 out of 10,289 containers for which that information was recorded at the door inspection). Bulman (1999) found as many as 45 percent of containers with packaging not matching the manifest description. However, in the current survey many cases involved one type of non-risk packaging being substituted for another (cartons instead of bags), rather than unmanifested wood. Unmanifested wood (packaging or dunnage)[16] was seen in 2,746 containers at the door inspection. Of the containers where unmanifested wood was not seen at the door inspection, 1,091 were followed up. Unmanifested wood was found in 87 of those containers during the follow-up inspection. This indicates that approximately 32.6 percent of loaded containers arrive with unmanifested wood, either packaging or dunnage, inside. The estimated 95 percent confidence limits are 31.1 percent and 34.0 percent.

Approximately 8.5 percent of loaded containers with manifest information (e.g. excluding FAK and “general goods” containers, where packaging information may have been provided on separate lists) had unmanifested wood requiring treatment or destruction. Of 9,494 loaded non-FAK containers, 1363 were followed up, and 116 were found with unmanifested wood requiring treatment or destruction.

3.4 ORGANISM INTERCEPTIONS

Seed samples were identified by the AgriQuality New Zealand Ltd seed laboratory in Levin, and arthropods, fungi and plant material by the AgriQuality New Zealand Ltd laboratory in Auckland. Species identified were classified as present in or absent from New Zealand by Landcare Research, and were also checked against the MAF Plants Biosecurity Master Pest List for regulated organism status. Where identification was only to genus, the presence or absence of the genus in New Zealand was noted. A full list of organisms intercepted, their status in New Zealand and the number of containers in which they occurred, appears in Appendix 1.

Plant or animal contaminants were recorded in 984 containers (2,243 specimens[17]). Of these, 367 containers had live or viable organisms (1,160 specimens). Most of the live organisms were found in loaded containers that were followed up (782 specimens in 224 containers). With 1,517 containers followed up, approximately 14.8 percent of loaded containers arrive with live or viable organisms. For empty containers, the rate is around 6.5 percent (60 of 920 empty containers had live organisms). However, many of these organisms already occur in New Zealand, and are not regulated (e.g. are not under official control, new strains or vectors of regulated organisms).

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[16] A container was said to have unmanifested wood when wood packaging or dunnage was found inside the container, and no wood packaging or dunnage was mentioned on the manifest. If a container was manifested as having pallets (a type of wood packaging), and it also contained wooden crates, this was an instance of packaging not as manifested, but the container was not considered to have unmanifested wood, because the presence of wood was indicated on the manifest.

[17] Here, “specimen” is used to denote all the individuals of the same identification found in the same container.

Regulated organisms[18] were recorded from 181 containers (299 specimens). Live (or viable) regulated organisms were found in 135 containers (236 specimens of 117 species). Most of these were in followed-up containers (93 containers, 166 specimens of 93 species). With 1,517 total containers followed up, this indicates that regulated species arrive in approximately 6.1 percent of loaded containers (95 percent CL 5.0 – 7.4 percent). Of the 920 empty containers surveyed, 15 (1.6 percent) contained 18 specimens of 11 regulated species (95 percent CL 0.9 – 2.5 percent).

3.4.1 Seeds

Seeds were found in 281 containers (330 specimens). Of these, 214 specimens in 204 containers were not sent for formal identification, generally because they were common food or crop seeds (e.g. maize, wheat, coffee) that were identified by the inspector at the time they were found. These seeds were generally residues of previous cargoes. Some of these crops are not grown in New Zealand, although the seeds are imported into New Zealand for food or other uses. Even seeds of crops that are grown in New Zealand represent potential vectors of plant disease. Three of the seeds identified belong to species or genera not established in New Zealand. Rice grains, found in 41 containers, were recorded as plant material rather than seeds, as they are no longer viable.

3.4.2 Fungi

Fungal specimens were found in 232 containers (906 specimens). In many cases, the fungi were located on wood packaging and could not be removed at the time of inspection. In other cases, fungi were cultured from plant or animal material inside the container. Of the specimens cultured for fungi, 243 fungal species or genera were identified. *Trichoderma harzianum*, which is present in New Zealand, was the most common fungus identified, occurring in samples from 28 containers. Fungi that were assessed as regulated organisms occurred in 51 containers (134 specimens of 66 species).

3.4.3 Arthropods

Insects were found in 280 containers (419 specimens), with regulated insects found in 59 containers (73 specimens). Live insect specimens were found in 141 containers (173 specimens). Of these, 27 specimens of live insects assessed as regulated organisms were found in 24 containers. These included 15 species of beetles (Coleoptera), 2 species of bugs (Hemiptera), 3 species of ants (Hymenoptera), 2 species of psocid and 2 of booklice (Psocoptera). Live regulated insects were found in 16 of 1,517 followed-up containers (1.1 percent) and in 3 of the 920 empty containers (0.3 percent).

Spiders were found in 269 containers (332 specimens), with regulated spiders occurring in 74 containers (87 specimens). Live spiders were found in 184 containers (228 specimens). Of these, 71 specimens of live regulated spiders were found in 60 containers. This includes live redback spiders[19], *Latrodectus hasselti*, which were found in 3 containers. Live regulated spiders were found in 43 of 1,517 followed-up containers (2.8 percent) and in 11 of the 920 empty containers (1.2 percent).

Three species of live mites not present in New Zealand were found in three separate containers landed at Auckland. A dead centipede was found in one container, and dead millipedes in two containers.

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[18] See the definition of "regulated organism" in the terminology section. This includes organisms formally assessed as regulated pests and those not present New Zealand, that are regulated as new organisms under HSNO.
[19] This species is of limited distribution in New Zealand and is currently regulated by the Ministry of Health.

3.4.4 Other organisms

Four containers were found with reptiles: two dead geckos, a dead skink and one live gecko, *Hemidactylus bowringii*, in a container from Hong Kong unloaded at Tauranga. This species was assessed as unlikely to survive in New Zealand but posed a risk to native reptiles as a disease vector (A.H. Whittaker, consulting herpetologist). Live snails were found in two containers and dead snails in three, and a live flatworm was found in one container.

3.4.5 Plant material

Leaves, bark, fruit and other plant material were found in 170 containers (194 specimens). Although the plant material was not nursery stock[20], many of the specimens were cultured for fungi, yielding 114 species. Of these, 26 were regulated organisms.

3.4.6 Animal material

Feathers were found in 34 containers. Some of the feathers were cultured for fungi, yielding 75 species, of which 16 were regulated organisms. Other types of animal material found included animal hair, pieces of bones, rat droppings and a bird's nest. The list of animal material found was submitted to Dr Howard Pharo, National Advisor Risk Analysis (MAF Biosecurity Animals) for comment. Although a specific risk assessment could not be done on the contaminant items without full and accurate knowledge as to their origins and other background, provided that the contaminants did not come into contact with susceptible animals, the risks due to the contaminants appeared negligible.

3.4.7 Organism Summary

Technical experts from MAF Biosecurity Authority and Landcare Research Ltd were requested to assess organisms identified by the container survey for their potential to harm the environment, human health or economy of New Zealand, with the outcome that most were considered to be either of minimal risk or generally benign.

While serious pests, such as Asian gypsy moth and giant African snail, are known to arrive with sea containers, the frequency with which such pests arrive in a live state appears to be relatively low. [21]

The insect of most concern as a plant pest was the Rutherglen bug (*Nysius vinitor*) – a potentially high impact pest of fruit, vegetable and oilseed crops, found dead in a container from Australia. An exotic stink bug, *Neottiglossa undata*, was found alive in a container from the USA; this species appears to favour grasses, so could be of concern to the pastoral sector.

Two other genera of concern were *Agrotis* sp. – 36 species listed as pests in Crop Protection Compendium 2001 (CPC) – and *Heliothis* sp. – 20 species listed in CPC 2001. Genera of these noctuid moths are present in New Zealand.

Other potentially serious insects found included:

- ants (one live nest of *Crematogaster* sp., a genus not present in New Zealand but common in Australia, was found inside a container);
- the khapra beetle *Trogoderma granarium* (found live with lentils from a previous cargo); and

[20] Defined as plants or plant parts for propagation: here, none of the material found was in a state suitable for casual propagation.
[21] New Zealand remains free of both these pests. They are actively targeted by MAF through the current import health standard as well as by the biosecurity awareness programme Protect New Zealand.

- wood-boring beetles (e.g. several species of *Sinoxylon, Xylion* and *Xylothrips*) associated with wood packaging.

Many organisms pose risks mainly to urban and natural environments, rather than the agricultural or rural sector. *Gryllodes* (a cricket), *Tribolium* and *Trogoderma* (two species of beetle), for instance, could become pests in urban environments and storage facilities.

Apart from the Australian redback spiders, which are regulated but already present in parts of the country, the spiders found appeared to pose little threat to New Zealand in terms of human health or the economy. However new species could potentially establish with unknown effects on native ecosystems, e.g. displacement of native spiders or predation of other native invertebrates.

Most of the fungal species found were identified as non-pathogenic saprophytes. Pathogenic fungi found included unidentified species of *Phoma, Phomopsis* and *Guignardia*. Many species of these genera have been categorised by MAF Plants Biosecurity as low impact pests, with only three being classed as potentially high impact – a stem blight *Phomopsis asparagi*, citrus black spot *Guignardia citricarpa* and black rot *G. bidwellii*. None of these were found in the survey.

The seeds and plant material found were not considered to be of serious concern by Landcare Research Ltd.

3.5 ACCURACY OF CERTIFICATION

3.5.1 Packing Certificates

Of the loaded containers surveyed, 82 percent had packing certificates[22]. This varied significantly among ports ($p<0.001$), as shown in Table 6. Auckland had a significantly lower percentage of containers with packing certificates than the other ports, and Lyttelton had a significantly greater percentage with packing certificates.

Table 9. Presence and accuracy of packing certificates for surveyed containers

	Auckland	Tauranga	Napier	Lyttelton	Total
No packing certificates	1,592	167	32	73	1,864
With packing certificates	5,289	1,360	335	1,454	8,438
% with certificates	77%	89%	91%	95%	82%
(95% CL)	(76% - 78%)	(87% - 91%)	(88% - 94%)	(94% - 96%)	(81% - 83%)
Correct certificates	4,343	1,316	150	1,205	7,014
Incorrect certificates	75	2	5	99	181
% w/correct certificates	98%	100%	97%	92%	97%
(95% CL)	(98% - 99%)	(99% - 100%)	(93% - 99%)	(91% - 94%)	(97% - 98%)
Not answered	871	42	180	150	1,243
Total	6,881	1,527	367	1,527	10,302

Most packing certificates were identified as being correct (97 percent overall). Lyttelton had the lowest percentage of correct certificates (92 percent), while 99.8 percent of packing certificates were identified as correct at Tauranga. Approximately 50 percent of the packing certificates identified as incorrect had no explanation given. Another 47 percent were identified as incorrect because the port of loading was not specified on the certificate, 3

[22] Excluding containers for which the question was not answered.

percent had "nil wood" specified when wood was present on the manifest, and 1 percent had other reasons given.

3.5.2 Cleaning Certificates

Over 90 percent of all containers (loaded or empty) arrived with cleaning certificates; however, the internal contamination rate of containers with cleaning certificates did not differ significantly from the rate for those without certificates. Table 10 shows the number of containers with and without certificates, and the percentage contamination for each group. The approximate 95 percent confidence limits for the percentage contamination are shown in parentheses.

Table 10. Internal contamination of containers with or without cleaning certificates

	With cleaning cert		Without cleaning cert		Total	
	N	% contam	N	% contam	N[23]	% contam
Loaded	9,962	21.2% (19.2 – 23.3%)	265	15.8% (8.0 – 27.4%)	10,285	21.0% 19.2 – 23.1%)
Empty	863	17.6% (15.1 – 20.2%)	43	23.3% (12.1 – 36.8%)	920	17.7% (15.3 – 20.2%)

Contamination rates for loaded containers with and without cleaning certificates did not vary significantly by place of contents origin, although the point estimates of contamination rate for containers without cleaning certificates were slightly lower than for those with cleaning certificates for most origins (Table 11). Containers from Japan had a lower internal contamination rate than most other regions, although the confidence intervals still overlap with other regions.

Table 11. Internal contamination rates of loaded containers by contents origin

	With cleaning cert		Without cleaning cert		Total	
	N	percent contam	N	percent contam	N	percent contam
Australia	3,031	18.0% (14.6 – 21.8%)	103	15.5% (8.0- 34.0%)	3,146	17.9% (14.5 – 21.5%)
China	1,208	22.5% (17.0 – 28.6%)	19	5.3% (0.1 – 18.5%)	1,230	22.1% (16.7 – 28.1%)
Europe	1,119	22.5% 17.0 – 28.6%)	18	0% (1 – 84%)	1,140	22.2% (16.8 – 28.2%)
SE Asia	1,227	24.0% (18.0 – 30.6%)	27	53.7% (9.7 – 97.7%)	1,259	24.3% (18.3 – 30.8%)
North America	748	23.5% (16.5 – 31.5%)	24	0% (1 – 84%)	776	22.9% (16.0 – 30.7%)
Japan	256	12.6% (5.0 – 24.0%)	5	0% (1 – 97%)	264	12.0% (4.0 – 22.9%)
Pacific Islands	58	20.2% (7.3 – 49.7%)	10	20.0% (2.8 – 48.2%)	68	20.2% 9.2 – 46.2%)

Although cleaning certificates clearly do not guarantee 100 percent freedom from contamination, they may be the reason that 80 percent of containers arrive free of internal contamination. Without the requirement for certificates, the proportion arriving with contamination could be much greater than 18-20 percent. The fact that most containers do have cleaning certificates may mean that those without certificates are still subjected, in most

[23] Not all forms had the presence or absence of a cleaning certificate noted, so the numbers do not sum to the total

cases, to internal cleaning. This may explain why similar levels of contamination were found for containers with and without cleaning certificates.

3.6 DOOR INSPECTIONS

The effectiveness of the door inspection process for detecting various types of risk material was calculated as the number of followed-up containers having risk material found at the door inspection, divided by the total number of followed-up containers with that type of risk material. Table 12 shows the effectiveness of door inspection for detection various types of risk material.

Table 12. Efficacy of door inspection process

Risk material	Followed-up containers with risk material found at door inspection	Total followed-up containers with risk material	Efficacy
Wood packaging	591	698	84.7%
bark on wood	17	81	20.5%
fungi on wood	16	57	28.1%
insect damage on wood	2	28	7.1%
live insects on wood	2	38	5.3%
Any contaminated wood	35	237	14.8%
External contamination	44	67	65.7%
External soil	39	54	72.2%
Internal seeds, soil, plant material	19	179	10.6%
Live insects	3	71	4.2%
Live spiders	5	124	4.0%
Regulated/new fungi	2	34	5.9%

The door inspection process is reasonably effective at detecting wood packaging material inside shipping containers: of the 698 followed-up containers with wood packaging inside, wood was detected at the door inspection in 591 of the cases[24]. Door inspection was less effective at finding contaminated wood packaging. Only 28 percent of the fungi, 21 percent of the bark, 7 percent of the insect damage and 5 percent of the live insects on wood were found at the door inspection. Overall, nearly 15 percent of the followed-up containers with contaminated wood packaging were identified at the door inspection. This result is substantially less than that of Bulman (1998), who found that 60 percent (115 out of 191) of containers with contaminated wood packaging were identified at the door inspection. However, Bulman’s survey containers were known to be high risk for wood packaging, and this may have resulted in a higher than average detection rate.

External soil, when present, was not always found at the door inspection: of 54 followed-up containers with external soil found, the soil was seen at the door inspection for 39 containers (72 percent) and missed for 15 (28 percent). In three cases, this was due to the top or underside of the container being inspected at the follow-up inspection but not at the door inspection. Most of the other containers with external soil found at the follow-up inspection had soil on the lower rail. In all 15 cases where external soil was found at the follow-up inspection, the quantity of soil was small enough that the inspector removed it by hand, rather than requiring the container to be washed. In comparison, 16 (41 percent) of the 39 containers with external soil found at the door inspection required washing.

[24] Excludes 5 containers where wood not visible by eye was found at the door inspection by using the camera. Figures for bark exclude one container where bark was seen by camera at the door inspection, but not by eye.

Door inspection is clearly not effective enough to detect a high proportion of live insects and spiders. Only 4 percent of the containers with live insects or spiders were identified at the door inspection. In the followed-up containers with live regulated insects and spiders, all of the specimens were discovered at the follow up, rather than the door, inspection. However, live regulated insects and spiders were found in several containers not followed up. Six of 10,285 containers had live regulated insects found at the door inspection: none of these containers were followed up. Of the 1,517 that were followed up, 16 (1.1 percent) had live regulated or new insects. Multiplying by the number without live regulated insects found at the door inspection (10,279) gives an estimated total of 108 additional containers with such insects; thus, approximately 5.2 percent of such insects were found at the door inspection. This is close to the result obtained for all live insects using only the followed-up containers.

For live spiders, 13 containers had live regulated or new species found at the door inspection, none of which were followed up. Of the 1,517 containers that were followed up, 43 (2.8 percent) had live regulated or new spiders. This gives an estimated total of 291 additional containers with such spiders, and an estimated efficacy of 4.3 percent. Again, this is close to the result obtained for all live spiders using only the followed-up containers.

A number of the regulated or new to New Zealand fungi were isolated from plant or animal material found during the follow-up inspections, rather than from wood packaging. This is partly why the efficacy for regulated or new fungi is only one-third of that for fungi on wood packaging. However, not all finds of plant material were sent away for fungal culture, so this figure may be biased towards follow-up inspections, when collecting such material would have been easier.

3.7 PROBE CAMERA TRIAL

Of the 10,285 loaded containers that were door inspected, the probe camera was used for only 95 inspections (0.9 percent). The rigid extension pole made use difficult except where containers were not stacked close together in the inspection area. Use of the camera did not appear to improve detection of unmanifested contents, but in 5 containers, the inspectors saw wood packaging with the camera that was not visible by eye. In two other containers where wood packaging was seen, the camera operator saw contamination (bark or fungi) that was not visible by eye. Most of the comments recorded by the camera operators stated that the stacking of the goods in the container made camera use difficult, or that only the short wand, rather than the extension pole, could be used, meaning that the back of the container could not be examined. The time to use the camera varied from 2-10 minutes, depending on the arrangement of goods in the container. The camera may be useful for inspecting items where visual inspection is awkward, such as used machinery, but not as a routine tool for inspecting sea containers.

3.8 CONTAINER MOVEMENT WITHIN NEW ZEALAND

The contents and contaminants present determine the level of risk posed by a container. However, the environment that the container enters has a bearing on risk exposure. Areas near ports are likely to be at greater risk of incursions and thus, surveillance activities for many pests are concentrated at port areas. Rural areas may be less likely to form the focal point for incursions, but any incursions that do start may not be detected in time for eradication to be successful.

Nearly 4 percent of all containers in the container survey (404 containers) were tracked from import and devanning through to storage, packing and export, to assess the movements of containers while in New Zealand (Table 13). Of the tracked containers, 263 had complete tracking information provided by the shipping agents, including arrival port, devanning address, storage address, packing address and export port. Full information was not available for the remaining 141 containers.

Table 13. Number of tracked containers

Port	Loaded containers surveyed	Some information received (% of surveyed)		Full information received (% of surveyed)	
Auckland	6,962	283	(4.1%)	176	(2.5%)
Tauranga	1,499	53	(3.5%)	36	(2.4%)
Napier	373	20	(5.4%)	14	(3.8%)
Lyttelton	1,511	48	(3.2%)	37	(2.4%)
Total	10,345	404	(3.9%)	263	(2.5%)

Each movement stage (import port to devanning place, devanning place to yard, yard to packing, packing to export port) was classified as occurring in a rural area (population less than 30,000), transiting through rural areas, or occurring in an urban area (population greater than 30,000). Most containers (84 percent) were devanned within the urban area of the arrival port. Some containers travelled through rural areas before being devanned in another urban area (14 percent of tracked containers), while only 2 percent of tracked containers were devanned in a rural area. Table 14 shows the number of fully-tracked containers moving into or through rural and urban areas.

Table 14. Urban and rural container movements

Port To Devanning	Devanning to Yard	Yard to Packing	Packing to Export	Number
Rural	Rural Transit	Rural Transit	Urban	3
Rural	Rural Transit	Urban	Urban	2
Rural Transit	Rural Transit	Rural	Rural Transit	1
Rural Transit	Rural Transit	Rural Transit	Rural Transit	1
Rural Transit	Rural Transit	Rural Transit	Urban	1
Rural Transit	Urban	Rural	Rural Transit	4
Rural Transit	Urban	Rural Transit	Rural Transit	3
Rural Transit	Urban	Rural Transit	Urban	5
Rural Transit	Urban	Urban	Rural Transit	7
Rural Transit	Urban	Urban	Urban	17
Urban	Rural Transit	Rural	Rural Transit	3
Urban	Rural Transit	Rural Transit	Rural Transit	1
Urban	Rural Transit	Rural Transit	Urban	1
Urban	Rural Transit	Urban	Urban	2
Urban	Urban	Rural	Rural Transit	69
Urban	Urban	Rural Transit	Rural Transit	12
Urban	Urban	Rural Transit	Urban	40
Urban	Urban	Urban	Rural Transit	7
Urban	Urban	Urban	Urban	84
Total				263

3.8.1 Devanning

Most containers (83 percent) were devanned in the urban area surrounding the port of arrival. Approximately 36 percent of containers were devanned at transitional facilities. After devanning, containers are returned to the shipping company.

3.8.2 Storage

None of the tracked containers were stored in a rural area; most storage yards are located close to ports. Most containers (94 percent) were stored in the urban area where they were devanned, with only 6 percent travelling through rural areas to storage sites in other urban areas. At the storage sites, a representative of the shipping company checks the containers for cleanliness, although this check may not occur for several days after arrival, depending on the demand for the container.

3.8.3 Packing

Nearly half (45 percent) of the tracked containers were packed in the urban area where they were stored. The remaining containers were nearly equally likely to be transported to a rural area for packing (29 percent of tracked containers), or transported to another urban area (26 percent of tracked containers).

3.8.4 Export

The majority of containers (59 percent) were exported from the urban area in which they were packed. However, 71 percent of containers were packed in an urban area (urban and rural transit packing), suggesting that 12 percent of tracked containers packed in an urban area were not exported from that urban area, but were transhipped to another area for export. This may be due to containers packed in inland urban areas such as Hamilton, being transported to a coastal area with an export port.

3.8.5 Movement Summary

Overall, 32 percent of tracked containers did not move outside the urban area surrounding the port of arrival. The other dominant movement pattern (26 percent of tracked containers) was of containers being devanned and stored within the urban area of arrival, transported to a rural area for packing, and then shipped out of an urban area. Some containers were devanned and stored in one urban area, but transhipped empty for packing and export from another urban area (15 percent), while 7 percent of containers were transhipped immediately after entry into New Zealand for devanning, packing, and export in another urban location within New Zealand.

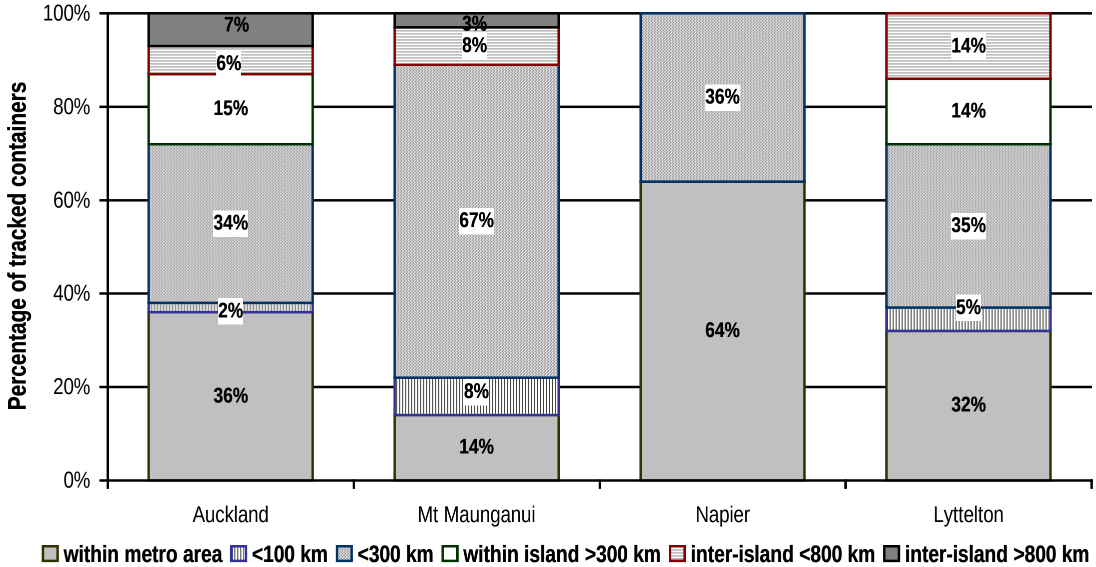
Fully tracked containers (containers with unpacking, storage and packing and export information) remained an average of 41 days in New Zealand, ranging from 5 to 186 days. The total length of stay did not differ significantly among ports, and the time between arrival at the storage yard and arrival at the packing site was by far the longest for each port. There were slight differences between ports in the length of stay at specific locations. Containers arriving in Auckland took longer, on average, to reach their devanning point (Table 15), possibly a reflection of the greater distances travelled before devanning. Containers originating in Lyttelton took the longest time to move from packing to export, possibly due to the wider spread of containers from this port. Conversely, containers arriving in Napier spent less time between the port and devanning and between packing and export, as Napier containers travelled a lesser distance.

Table 15. Average days spent by containers in New Zealand (N=sample size)

Average times	Auckland	N	Tauranga	N	Napier	N	Lyttelton	N
Port inspection to devan site	4.5	259	2.0	40	1.7	13	2.0	48
Devan site to storage yard	4.7	269	3.9	41	2.6	15	3.3	47
Storage yard to packing site	22.0	215	27.3	42	27.8	17	22.4	38
Packing site to export port	8.8	204	7.9	39	5.5	17	11.8	38
Import to export	40.4	229	45.3	37	37.4	17	40.6	41

As containers move further, the potential for them to spread unwanted contaminant increases. Figure 7 shows the maximum distances travelled by tracked containers away from their port of entry.

Figure 7. Maximum distances travelled by tracked containers



Auckland, Tauranga and Lyttelton had 11-14 percent of containers move between islands, while all of the tracked containers landing in Napier remained within 300 km of Napier. Containers imported into the regional ports (Tauranga, Napier) were much more likely to stay within the import region, or adjacent provinces, whereas containers imported into the larger, metropolitan ports, were more likely to either a) remain within the metropolitan area, or b) be shipped a considerable distance, including inter-island. Larger agents/importers based in the main centres may be more likely to import large consignments and distribute them within New Zealand after arrival, while smaller, regional agents and importers are more likely to deal with local markets only. These trends are likely to change over time as ports compete for new import and export markets.

Containers were generally unpacked in the metropolitan area surrounding the port of arrival. However these patterns changed with import port. Containers arriving in Auckland were devanned across New Zealand, and Auckland was the only survey port to receive containers that were then transhipped the length of New Zealand before devanning. Maps showing the devanning sites of containers imported into each survey port are shown in Appendix 2, Figures 8-11. Containers from Tauranga were devanned throughout the North Island, with a large number devanned in Auckland (possibly through Metroport) (Figure 9). Napier containers were generally devanned in the lower North Island (Figure 10), while those arriving at Lyttelton generally remained within the Christchurch area for devanning (Figure 11). None of the tracked containers for which full information was received were packed with domestic cargo between ports.

Containers were generally stored at the yard nearest to the containers devanning point (Figures 12-15 in Appendix 2). As most containers were devanned close to the port of entry the majority of containers were also stored close to the port of entry. Containers imported into Tauranga appear to be an exception, as the majority of these containers were stored at Auckland yards. This may be due to transhipment of containers from Tauranga to Metroport.

Until packing, most containers remained within urban areas close to their port of import. Containers from all ports surveyed moved the greatest distances to be packed for export (Figures 16-18). This was particularly evident in the movement of containers from Auckland, of which 12 percent of containers for which a packing address had been obtained were packed in the South Island. Generally, packing trends were the same as devanning trends. Auckland containers were packed over the greatest spread, while Napier containers were generally packed in the lower North Island (with one container packed in the South Island). Lyttelton containers were packed in the South Island (with one container packed in Auckland). Again, Tauranga differed, with more containers packed in Auckland than the surrounding metropolitan areas of Tauranga.

A number of areas were identified where containers remain stationary for periods of time. Some of these sites would not be subject to current surveillance programmes. Hawera (Taranaki), Te Rapa (Waikato), Temuka (Canterbury) and Clive (Hawkes Bay) all receive larger than expected proportions of containers and are all rural areas located some distance from port areas where surveillance is concentrated.

3.9 SUMMARY: ASSESSMENT OF PATHWAY RISKS

Table 16 summarises the percentage of containers affected by different risk factors based on the survey results, and also the effectiveness of door inspections at detecting risk material.

Table 16. Summary of survey results

Percentage of containers with:	Loaded	Empty
Biosecurity risk cargo	17%	n/a
Unmanifested biosecurity risk cargo	1.7%	n/a
Non-conforming unmanifested biosecurity risk cargo	0.2%	n/a
Wood packaging material	48.5%	n/a
Unmanifested wood packaging material	32.6%	n/a
Infested wood packaging material	15.6%	n/a
Unmanifested infested wood packaging material	8.5%	n/a
Internal contamination	21.0%	17.7%
External contamination	4.4%	2.0%
Live or viable organisms	14.8%	6.5%
Live or viable regulated organisms	6.1%	1.5%
Percentage of tracked containers:		
Taken to a rural area for packing before export	26%	n/a
Transported through a rural area while in New Zealand	42%	n/a
Efficacy of door inspection process at finding:		
Wood packaging	84.7%	n/a
External soil	72.2%	n/a
Live organisms excluding fungi	approx. 4%	n/a

The container pathway risks associated with slippage of goods, packaging, external contamination and live organisms were assessed as to the incidence of risk material in containers, the ability of current procedures to detect the risk material, and the likelihood of exotic organisms being present.

3.9.1 Unmanifested Biosecurity Risk Cargo

A significant number of containers arrive with biosecurity risk goods, most of which are identified on the manifest and routinely cleared by the biosecurity cargo clearance process. Unmanifested biosecurity risk cargo, while found during the survey, only occurred in 1.7 percent of containers, and less than 1 percent of containers had unmanifested goods that did not conform to an import health standard on arrival. Only one container (fresh coconuts manifested as “chiller cargo”) had live regulated pests associated with the cargo: this consignment was stopped by quarantine staff based on profiling and experience, and the insects were found during the normal product inspection. Pests associated with particular types of risk goods are generally managed by import health standards specific to those goods. In general, the risks of unmanifested biosecurity risk goods appear to be adequately managed by current procedures, although improvement in manifest descriptions would assist in identifying risk cargo.

Incidence: low **Detection: moderate-high** **Organisms: low**
Summary: risk from containers with unmanifested risk goods Low

3.9.2 Wood Packaging

Wood packaging arrived in nearly half of the loaded containers surveyed, and around 30 percent had wood packaging not indicated on the manifest. Detection of unmanifested packaging is dependent on quarantine officer experience and manual profiling. Over 8 percent of containers had unmanifested wood packaging that required biosecurity action. The door inspection process was 85 percent effective for detecting wood packaging material when present in containers; however, it was much less effective at finding contaminated wood packaging, particularly wood harbouring live insects.

Incidence: moderate **Detection: moderate** **Organisms: moderate**
Summary: risk from containers with infested wood packaging **Moderate**

3.9.3 External Contamination

Soil, the main type of external contaminant found in the survey, was present on 3.6 percent of loaded and 1.3 percent of empty containers. The tops and undersides of containers were not examined in this survey. Previous studies (e.g. Gadgil et al 1999 and Marshall and Varney 2000) have found significantly greater levels of external soil contamination (e.g. 31-34 percent), although these surveys included inorganic mineral contamination as well as organic soil. In Gadgil et al (1999), the underside of containers accounted for 58 percent of the soil samples and 61.5 percent of all external contaminants found. Most of the live organisms were found on the undersides of the containers. Marshall and Varney (2000) did not examine the undersides of all containers, but found that the external base of the container, visible when it was sitting on the wharf, provided a good indication as to the presence of soil underneath. In the current survey, the external inspection on the wharf was 72 percent effective at detecting external soil contamination, but the results of Gadgil et al (1999) suggest that without inspecting the undersides, detection of organisms would be lower. Marshall and Varney (2000) found organic soil on less than 1 percent of the containers surveyed, and in both the previous surveys, many of the organisms isolated from the soil samples were present in New Zealand. Data from Gadgil et al (1999) indicate that live organisms occur externally on less than 1 percent of containers as well, although high-profile pests such as Asian gypsy moth and giant African snail have been associated with container undersides.

Incidence: low **Detection: moderate** **Organisms: low**
Summary: risk from containers with external contamination **Low-Moderate**

3.9.4 Live Organisms

The survey results indicate that live or viable organisms, either associated with the wood packaging or the container box, arrive with a significant percentage of containers (14.8 percent of loaded and 6.5 percent of empty containers). Most of the organisms are inside, rather than outside, the containers. Regulated organisms arrive with 6.1 percent of loaded and 1.5 percent of empty containers. In addition, the door inspection process appears to detect only a small percentage of the containers arriving with live organisms. The results of the movement survey suggest that 83 percent of loaded containers are unpacked within the urban area where they are imported; a small number of containers with exotic organisms could be transported to or through rural areas prior to unpacking.

Incidence: low **Detection: low** **Organisms: high**
Summary: risks from containers with live organisms **Moderate**

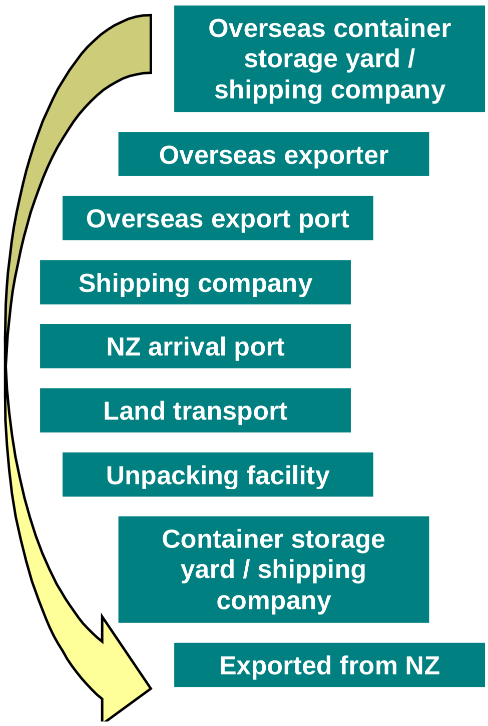
4. Risk Mitigation

4.1 RISK MITIGATION STRATEGIES

With the publicity surrounding the painted apple moth response in Auckland and the release of the Auditor-General's review of biosecurity (OAG 2002a, 2002b), there have been calls for all, or close to all, sea containers to be inspected by MAF on arrival (e.g. *HortNews* 18/6/02; *NZ Herald*: 28/11/02, 02/12/02; *Stuff* website 26/2/03). While such calls may or may not acknowledge the immense impact such an inspection programme would have on the sea cargo industry, in terms of cost and logistics, they do suggest the costs would be warranted given the expected spending on biosecurity responses (e.g. $90 million for painted apple moth). While the painted apple moth incursion has been only anecdotally linked with sea containers (OAG 2002b), there is no guarantee that a 100 percent inspection programme would fully manage all the risks associated with sea containers.

The key findings of the case study on sea containers by the Auditor-General (OAG 2002b) indicate that full external and internal inspections of all containers on arrival would be impractical, and would give no guarantee that all risk organisms could be detected. The recommendations of the case study were: that MAF use a more robust method of risk profiling to select containers for inspection; that the system be adaptable to meet changes in risk profiles; that the accuracy of cleaning certificates be improved; and that the benefits of an integrated IT system for risk profiling, with links to NZ Customs Service, importers, freight forwarders and shipping companies, be investigated.

Figure 8. Imported container process flow



As shown by the survey results, the risks associated with sea containers are diverse and not likely to be adequately mitigated by a single measure applied to all. Instead of managing the risks by inspection or treatment of all containers at the border, the proposed strategy integrates risk mitigation measures into each step of the container logistics process (see Figure 8), with risk profiling used to determine the level of intervention required on arrival in New Zealand.

As an example of how such a system might work, consider the risk of external contamination. Checks for external contamination would begin at the overseas container storage yard, with shippers being made aware of the requirements for New Zealand containers, and a requirement to check for contamination built into the container structural check done before delivery to the exporter. Information for exporters to New Zealand would also state the requirements to check for contamination, and give notice that containers must arrive free of contamination or incur additional compliance costs. Further checks for external contamination could occur as the container is loaded at the overseas port. Then, instead of all containers receiving a six-sided external inspection on arrival, containers identified as low risk[25] by the profile might be inspected at unpacking, with a response system in place to ensure that any contamination found was dealt with appropriately. A feedback system into the risk profiling system would enable an amendment of the container risk profile based on the contamination found. A last check could occur as the container is inspected at the storage yard, prior to being sent to a packing site for export.

Containers posing a high risk of external contamination would require a more rigorous system for dealing with potential contaminants. This could involve a six-sided inspection at the wharf on arrival, to prevent external contaminants from being transported throughout New Zealand. Again, the results of the inspections would be fed into the profiling system, to enable continuous updating of the profile. Alternative measures for removing external contamination, such as pressurised washing of high-risk containers in the country of origin, could be proposed by industry and accepted, as long as an equivalent level of risk mitigation was achieved.

A well-designed integrated system would result in higher risks being mitigated earlier in the logistics pathway, and more of the risk being kept offshore than at present. By the time containers arrive at a New Zealand facility for unpacking under the proposed strategy, they should pose very little biosecurity risk.

4.2 PROPOSED RISK MITIGATION MEASURES

This section discusses potential measures for mitigating risks associated with the importation of sea containers. Many of these measures are linked, and would require the implementation of other measures to be fully effective. As stated in section 7.1, risk mitigation would be targeted using profiles, with containers posing higher levels of risk receiving higher levels of intervention. Instead of attempting to manage all risk at the border, the aim is to leave the bulk of the risk offshore, with progressively lower levels of risk dealt with as the container progresses through the pathway into New Zealand.

As a part of the sea container review, research into new technologies for mitigating container risks was also undertaken. A synopsis of this research appears in Appendix 3.

[25] Here, "low risk" would indicate low risk for contamination

4.2.1 Biosecurity Awareness Material

This measure involves providing information in appropriate languages to offshore exporters, shipping companies, port companies and importers to explain New Zealand's biosecurity requirements for containers. It would focus on the benefits of complying with New Zealand's requirements, and also the direct and indirect costs of non-compliance. This measure would augment the work of Protect New Zealand, but would be an integral part of cargo facilitation.

Methods for getting the information across could include:

- web pages;
- brochure on the biosecurity aspects of shipping goods in containers to New Zealand;
- video;
- CD-Rom;
- "stock" contract clauses to be inserted into delivery contracts between New Zealand importers and overseas exporters, requiring compliance with New Zealand's biosecurity as a condition of purchase. Non-compliance would ideally be a charge against the exporter.

The principal thrust of the message would be the need to comply with New Zealand's container importation requirements, and the consequences of non-compliance. This information should be targeted at overseas exporters, shipping companies, overseas and local port authorities, importers, transport operators, unpacking and storage facility operators, with foreign-language or pictorial translations available. It would be useful to engage the assistance of Ministry of Foreign Affairs and Trade, the Importers Institute, Customs Brokers and Freight Forwarders and overseas biosecurity agencies in the development of messages and materials.

Biosecurity awareness offers the following advantages:

- will lead to greater compliance and reduce costs;
- reduction in biosecurity risks;
- such programmes could be expected to show a quick return, as very little material is currently available;
- can leverage off work already done by the Protect New Zealand programme;
- can be linked into the biosecurity requirements of other countries.
- disadvantages with this measure include:
- the cost of preparing material for a very diverse audience
- on-going funding may not be available.

Estimated Time to Implement: six to nine months.

4.2.2 Offshore Certification

Currently, shipping companies supply cleaning certificates at the port of unloading, attesting to the internal cleanliness of their containers. Although the survey results have shown that 18-21 percent of containers covered by cleaning certificates are internally contaminated, the certification requirement may be the reason that the other 80 percent (360,000) arrive uncontaminated. It is proposed that this certification process be widened to also cover exterior contamination. Currently, containers are examined under an international standard prior to delivery to the exporter, to check that they are structurally sound and fit for purpose. The potential exists to integrate biosecurity requirements regarding contamination into this standard. The validity of the certification would be audited on arrival in New Zealand: certified containers found to be contaminated would raise the risk profile of the certifier, and possibly the exporter, shipper, goods and/or importer, with the potential for increased inspection and compliance costs until such time as the problem was rectified.

The certification would continue, in most cases, to be a responsibility of the shipper, as official certification by overseas regulatory authorities would be impossible in many cases, or so costly as to be prohibitive to trade. Such a requirement could also have reciprocal implications for New Zealand exports. Uncertified containers would be considered high risk and be subject to on-arrival inspections.

Offshore certification offers the following advantages:

- risk mitigation carried out offshore;
- shared responsibility;
- facilitated entry of the container;
- some cost borne by exporter;
- in some circumstances, certification may provide equivalence for some arrival processes and further facilitate delivery.

Disadvantages with this measure include:

- cost of awareness and auditing programmes;
- difficult to monitor processes to ensure compliance.

Estimated Time to Implement: Six months

4.2.3 International Harmonisation of Biosecurity Standards for Containers

It is proposed that New Zealand work with international stakeholders to promote the international harmonisation of biosecurity standards for containers and containerised cargoes. This could include information management, biosecurity awareness and biosecurity certification. International standards have already been developed for sea container equipment and cleanliness inspections (IICL 1996, 2000) and for solid wood packaging materials (FAO 2002b); amendments to existing standards and development of further standards or international agreements could be promoted. Container biosecurity issues would be raised with groups such as the International Chamber of Shipping, the International Maritime Organisation and the Institute of International Container Lessors.

In addition, international biosecurity agencies could create shared container risk profiles. They could also undertake investigations into new and innovative technology such as infrared detection, closed circuit TV (CCTV) and irradiation to improve effectiveness and reduce costs. Efforts to harmonise regulations to reduce biosecurity risks associated with containerisation of cargo have already begun between Canada, the USA and Mexico, in an attempt to prevent pest introduction into North America via wooden packing materials (Allen et al 1997).

International standards and harmonisation offer the following potential advantages:

- enhanced awareness of the biosecurity risk and requirements for sea containers;
- a standard “look and feel” to container biosecurity documentation and requirements, which would result in greater recognition and compliance;
- will lead to greater compliance and reduction in global biosecurity costs;
- risk profiles can be built more quickly and targeted more finely by incorporating data from larger countries;
- can be built on existing international relationships and structures.

Disadvantages with international standards include:

- difficult and time-consuming to get international agreement on standards;
- New Zealand may require higher standards of compliance than international agreements can deliver.

Estimated Time to Implement: Incremental over 18-24 months.

4.2.4 Intelligence-based Electronic Risk Profiling System

Targeting high-risk containers using an electronic risk profiling system, with links to NZ Customs Service and the shipping industry, was included in three of the five recommendations of the Auditor-General's case study on sea containers (OAG 2002b). Containers are currently detained and actioned using a manual paper-based system. With around 450,000 containers entering New Zealand per annum a paper-based system cannot deliver the necessary intelligence that would be required to develop and maintain up-to-date container risk profiles.

Valuable profiling work has already been carried out on the sea container pathway by Bulman (1992, 1998, 1999), Gadgil et al (1999) and Ridley et al (2000). This research and the results of the current survey will form the basis for initial development of formal risk profiles for sea containers.

Electronic risk profiling offers the following advantages:

- increased efficiency and effectiveness by targeting high-risk containers, cargo, origins, shippers and importers;
- faster processing for MAF, shipping companies, port companies and consignees;
- Could form part of a whole of government import goods management system or a joint Australasian biosecurity and customs system;
- allows large amounts of data to be captured and analysed, and can therefore be used as an ongoing profiling tool for identifying higher-risk containers;
- information on the biosecurity status of specific containers could be made available online to all affected parties;
- containers can be tracked until they receive biosecurity clearance;
- allows easier identification of compliance history of importers, exporters, shippers and shipping companies or agents;
- ensures national consistency in the management of risk in the pathway;
- ensures every container is risk assessed;
- facilitates sharing of information with international counterparts i.e. AQIS, APHIS, CFIA;
- builds on the existing industry electronic capabilities;
- minimises compliance costs.

The disadvantages with this measure include:

- relatively high development and establishment costs;
- need to maintain a manual system until all parties have compatible electronic systems.

Estimated Time to Implement: Interim solution: 6-9 months
Whole of Government solution: 3 years

4.2.5 External Visual Inspection

This measure involves inspection of the external surfaces of containers, and can occur at a number of stages along the container logistics pathway (see Figure 8). The overseas shipping company inspects containers prior to delivering them for packing, to ensure that the containers are structurally sound and fit for purpose. A requirement to check for external contamination before packing containers for New Zealand could be incorporated into this process. As the container is loaded on board the vessel, and again during unloading, loading operators could be briefed to look for contamination. A six-sided external inspection on the wharf is likely to be a preferred option for high-risk containers (as identified by intelligence-based risk assessment). For lower-risk containers, external inspections could take place as the containers are loaded on domestic transport, as they are unpacked at a facility, and on arrival at a storage yard.

External inspection offers the following advantages:

- six-sided inspections are capable of detecting most significant external contaminants, including live organisms or egg masses that are most likely to be present on the undersides of containers (Gadgil et al 1999);
- inspection of the four lateral sides, particularly the external base/rail area, has been shown to detect most significant soil contamination (Marshall & Varney 2000).

Disadvantages with this measure include:

- would result in very significant costs and congestion if a large proportion of containers required inspection on the wharf;
- cost of dealing with OSH requirements for six-sided inspections;
- facilities needed to remove contamination.

While a formal six-sided inspection would likely be reserved for containers posing a high risk of external contamination, the undersides of containers would be visible during loading and unloading. As the external cleanliness of containers would be covered by cleaning certificates (measure 7.2.2), shipping companies could decrease compliance costs by developing systems for external inspection, treatment and certification of containers found contaminated, before they are sent to New Zealand.

Estimated Time to Implement: Six-sided external inspection of high-risk containers on arrival at the ports occurs now. Integration of external inspections into other areas of the container logistics pathway would be dependent on industry co-operation, occur progressively, and be driven by compliance costs associated with increased inspection regimes imposed on those with a history of non-complying containers or documentation.

4.2.6 External Decontamination and Inspection Systems for Containers

Pressurised decontamination (with water, dry ice or air) of the exterior of sea containers to remove external biosecurity risk material has been shown to be technically feasible. This process could be automated. If this technology were integrated into container discharge and handling procedures, it would provide equivalence to a 6-sided external inspection for high-risk containers. Pressurised washing has been shown to be effective in removing soil and Lymantriid egg masses from containers (see section 12.3 in the synopsis of new technology research).

It would be possible to place closed circuit television (CCTV) equipment in a range of locations over the overall arrival process to remotely view the exterior of containers during discharge and movement on the wharf. Cameras could be located on container cranes, straddles, forklifts, appropriate "on-wharf" locations, and at wharf gates with monitoring at a central location to detect exterior contamination.

Automated washing and inspection of containers offers the following advantages:

- washing would remove all external biosecurity risks;
- containers washed before delivery could result in reduced inspection activity required at unpacking sites for low-risk containers;
- suitable as an alternative to six-sided inspection of high-risk containers;
- CCTV would detect gross contamination and large or highly visible pests;
- CCTV may be less expensive than manual inspection.

Disadvantages with these measures include:

- capital and operating costs are high;
- washing would not be suitable for all types of containers – e.g. soft-tops;
- washing may damage cargo if the container is damaged;
- disposal of contaminated waste water would result in Resource Management Act issues and compliance costs;
- CCTV may miss small contaminants;
- CCTV may be less effective in wet weather or at night.

Estimated Time to Implement: This would depend on the industry demand for such systems.

4.2.7 Chemical and Heat Treatments

Most containers can be reliably fumigated with a gas such as methyl bromide to deal with live unwanted organisms on external and internal surfaces. In addition, a knockdown pesticide could be applied to the internal surfaces of containers either on the wharf or immediately prior to unpacking. It is also technically feasible to heat whole shipping containers loaded with a range of commodities to kill the majority of pests (see section 12.4 in the synopsis of new technology research). Entire containers could be heated in a chamber, or hot air could be forced into the container, heating only the interior. Heat treatments are experimental at this stage but may be a useful tool in the future to kill arthropods in non-complying containers.

Although these systems could reduce the number of live arthropods present, in practice they would be recommended only when the presence of live pests is known or suspected. The survey indicated that less than 5 percent of the surveyed containers arrived with live regulated arthropods.

Treatment with chemicals or heat offers the following advantages:

- methyl bromide and pesticides would kill a wide range of organisms, although not all;
- heat treatment would kill all hitchhiking insects, spiders, reptiles and most other organisms;
- heat treatment or fumigation in a chamber would mitigate both interior and exterior risks.

Disadvantages with these measures include:

- some cargo could be damaged by fumigation or heat treatment;
- methyl bromide is an ozone-depleting gas;
- exhausting the gas has Resource Management Act implications;
- potential health risk to staff opening fumigated containers;
- fungi would require high heat levels for effective treatment;
- different pests and products require different fumigation rates to achieve effective treatment without causing phytotoxic problems;
- heat treatment set-up and operating costs are high.

Estimated Time to Implement: Facilities exist now for container fumigation and insecticide treatment; development of heat treatment facilities would be dependent on industry demand.

4.2.8 X-ray Screening of Containers

This measure would involve x-raying containers prior to leaving the wharf. The equipment to x-ray containers is available now. The process is slow and very expensive.

X-ray screening offers the following advantages:

- enable detection of most wood packaging without opening the door;
- may detect unmanifested goods or significant quantities of undeclared fruit and seeds;
- may have benefits for other government departments, such as NZ Customs Service and NZ Immigration Service.

Disadvantages with this measure include:

- x-ray screening is presently incapable of detecting most organic contaminants, such as hitchhiker pests;
- very expensive to establish and operate.

Estimated Time to Implement: Unlikely to be implemented due to lack of cost effectiveness.

4.2.9 Supervision of Container Unpacking

This measure involves monitoring of loaded containers at the point of unpacking. It is logistically or economically impractical for MAF inspectors to physically monitor all containers being unpacked. This is due to the quantity (250,000 or more full containers per annum) and because containers are often unpacked away from the port where they were discharged.

A small number of containers at a high risk of external contamination would still require an on-wharf inspection (external inspection at the unpacking facility would not replace the on-wharf inspection for these containers).

With this measure, all sites and facilities receiving containers would have a MAF-approved person present when the container is delivered and unpacked. This person would be specifically trained to MAF standards to look for biosecurity contaminants, required to report all sightings of contaminants to MAF and take prescribed action to contain any risk. As with current transitional facilities, all biosecurity contaminant material would be disposed of following authorised procedures. Failure to comply would result in the facility no longer being able to receive containers. The location of the facility could be taken into account as a risk mitigation factor. For instance, high-risk containers might require an external inspection on the wharf and be restricted to unpacking facilities in the urban area of import, while containers posing a lower risk of external and internal contamination could be allowed to travel further before being externally inspected and unpacked. This risk assessment process would be undertaken using the intelligence-based risk assessment tool described in section 7.2.4.

Supervision of container unpacking by an approved person trained to specified MAF standards offers the following advantages:

- enables every loaded container to be subject to an external and internal inspection without requiring them to be inspected on the wharf;
- as shown by the survey results, inspection during unpacking gives much greater detection of internal contaminants, particularly live organisms, than door inspection on the wharf, which is often hampered by cargo;
- for containers that would be inspected anyway, inspection at the unpacking site would be at a lower cost than inspection by MAF or an approved person at wharf;
- enables surveillance of cargo, packaging and containers for random hitchhiker organisms.

Disadvantages with this measure include:

- cost of training, authorising and auditing of approved staff and facilities;
- potential conflict-of-interest issues would have to be resolved.

Estimated Time to Implement: Approximately 6 – 18 months.

4.2.10 Enhanced Compliance Strategy

Existing systems do not readily hasten the movement of containers for parties who consistently comply with New Zealand's container biosecurity requirements. Nor do they enable the identification and targeting of parties who consistently fail to comply with the requirements. It is proposed that the intelligence-based risk profiling system described in section 7.2.4 be used to track compliance history of exporters, shippers and importers. Consistent compliance could result in improved facilitation for the importing parties, while non-compliance would naturally result in increased intervention and costs that would be targeted at the risk exacerbator. Prosecution of repeat offenders or those deliberately making false declarations or certifications will be considered.

An enhanced compliance strategy offers the following advantages:

- greater compliance reduces overall risks and costs, and improves facilitation;
- links sanctions to non-compliance;
- increased cost for non-compliant importers, which would tend to drive compliance.

Disadvantages with this measure include:

- increased administration costs for MAF in maintaining compliance histories and altering profiles based on compliance.

Estimated Time to Implement: Final implementation linked to intelligence-based risk assessment database implementation.

4.2.11 Other Factors with potential to Mitigate Risks associated with Sea Containers

Surveillance at Biosecurity Hazard Sites

Surveillance for various organisms currently occurs at port areas. The potential for additional post-border surveillance as risk mitigation for the sea container pathway will be considered during the wider MAF biosecurity surveillance project, which is currently underway within the Ministry of Agriculture and Forestry.

USA Container Security Initiative

In the wake of September 11, the United States of America launched the Container Security Initiative (CSI) to prevent global containerised trade from being exploited by terrorists. This involves significantly increasing security requirements for all shipping containers loaded on vessels bound for US ports. A critical element in the program is the use of advance information to target containers posing a potential risk.

The new requirements will include provision of inbound cargo manifests to US Customs 24 hours prior to loading for any shipments bound for the USA. These manifests will be used to identify and target high-risk containers. In June 2002, the World Customs Organisation passed a resolution enabling ports to collect data concerning outbound shipments in electronic form and to use risk management to identify and target high-risk shipments[26]. This world-wide increased focus on container security should result in improvement of manifest information supplied by exporters (e.g. a cargo description of "general goods" would not likely be sufficient to enable loading of a container on board a vessel). Although only the USA currently requires the advanced manifest information, all of its trading partners will be required to supply such information. If New Zealand made the case that biosecurity also

[26] http://www.customs.gov/xp/cgov/newsroom/press_releases/112002/11012002_4.xml

necessitated the provision of advanced information, it could be possible to better target high-risk containers and the ability to keep a greater proportion of risk offshore.

Benefits of the CSI include:

- ability to require detailed and accurate manifest information before containers are shipped to New Zealand;
- better information about cargo and packaging used in the container;
- potential to impose sanctions for inadequately or mis-manifested cargo and packaging materials;
- containers with inadequate information or non-conforming contents could be denied loading;
- containers posing a high risk for contamination with certain organisms (e.g. giant African snail, Asian gypsy moth) could have alerts placed on them before shipping, giving exporters the option to have them decontaminated and certified overseas.

While New Zealand could not have instituted such requirements on its own without seriously impacting on NZ trade, most major trading partners will in time have to provide advance information to the USA anyway; therefore, the systems will already be in place to provide this information to New Zealand. It is likely that CSI will enhance the quality and timeliness of container documentation. These benefits will serve to enhance the biosecurity profiling of containers.

Estimated time to implement: 1-3 years. The US is currently working to implement the requirements of the CSI at the top 20 ports exporting to the US. These ports include many of the major ports of export to New Zealand (e.g. Singapore, Hong Kong and Nagoya), although no Australian ports are included in the list. However, it is likely that all ports wishing to export to the US will eventually be required to comply with the CSI. The accuracy of manifest information and other documents supplied by exporters is expected to gradually improve over the next several years.

4.2.12 Relationships among Measures

Full implementation of several measures would be dependent on the development of an intelligence-based risk assessment system, including the audits associated with offshore certification and supervision of New Zealand unpacking facilities. The feedback from these audits would be necessary to provide the input for the enhanced compliance strategy. The results of the audits and compliance inspections would in turn feed back into the risk assessment system to modify the risk container profiles.

The development and harmonisation of international standards for containers has links with preparation of biosecurity awareness materials. Developing common biosecurity awareness materials for containers destined for New Zealand, Australia, the USA or Canada would result in a greater uptake of information and greater compliance.

The development of alternative types of treatments for high-risk or contaminated containers will be considered, as long as appropriate biosecurity risk mitigation occurs (e.g. exterior pressurised washing might be an alternative to six-sided inspection for mitigating risks associated with external contamination).

4.3 IMPACT OF RISK MITIGATION MEASURES

Table 17 summarises the expected impacts of the mitigation measures on the risks assessed in section 6.9. Impacts were considered in terms of reducing the incidence of the risk or improving detection.

Table 17. Expected impacts of mitigation measures

	Unmanifested risk cargo	Contaminated wood packaging	External contaminants	Internal live organisms
Biosecurity awareness material				
Offshore certification	–	–		
International standards harmonisation		+		
Intelligence-based risk assessment	+	+		
External visual inspection	–	–	+	–
External CCTV inspection	–	–		–
External decontamination	–	–	+	–
Chemical and heat treatment	–	+	+	
X-ray screening		+	–	–
Supervision of unpacking	+	+	+	+
Enhanced compliance strategy				
Hazard site surveillance	–	–	–	+
Container Security Initiative	+		–	–

Note: A “+” indicates that the measure is expected to significantly reduce a particular risk, either by improving detection or reducing incidence. A “ ” indicates that the mitigation measure may moderately reduce a particular risk. A “–” indicates that the measure is not expected to impact on a particular risk.

4.4 SUMMARY: RISK MITIGATION RECOMMENDATIONS

Clearly, no one mitigation method will adequately reduce all risks associated with sea containers. Supervision of unpacking would significantly reduce risks in most areas, but as it occurs post-border, the higher-risk external contaminants would have to be dealt with earlier in the system. Also, the wide variety of commodities, shipping companies, importers and sources means that requiring all containers to undergo a certain measure (for instance, six-sided external inspections) would result in very significant and unnecessary compliance costs for a large segment of the industry. An integrated system involving a number of mitigation steps, which may vary with the type of container, commodity or importer, is proposed as the most effective strategy for reducing biosecurity risks with a minimal impact on trade. It also encourages improvements in compliance by offering smooth movement of containers for importers who comply.

Chief among the measures that are recommended for implementation is the development of an intelligence-based risk assessment system. This measure gives the ability to determine compliant and non-compliant commodities, shippers or importers, and would be required in order to implement a number of other measures (e.g. supervision of unpacking, an enhanced compliance strategy and management of the offshore certification and unpacking facility audit results). Ideally, the development of such a system should be part of a whole-of-government initiative, with the database “owned” by the Government and available for use by agencies with a need for risk-based container information. From a wider perspective, this capability could be developed to meet the combined needs of New Zealand and Australia.

The early development of specific biosecurity information dealing with the risks and requirements for sea containers will be critical for involving all parties in the risk mitigation strategy. Supervision of unpacking and offshore certification (amended from its present form) are also recommended for design and implementation within the next 6 to 18 months.

Currently, facilities and procedures exist for on-wharf external inspection and treatment of containers. Development of new technology and systems to facilitate these processes, such as CCTV, x-ray machines, auto-washing and new treatments, could occur as commercial ventures, dependent on demand. This demand is likely to be driven by industry rather than regulation.

Progress on international harmonisation of biosecurity standards would be expected between 18 and 24 months from the promulgation of the new import health standard for sea containers.

The potential for introducing enhanced hazard site surveillance should be considered as part of the wider Biosecurity surveillance review.

It should be noted that all measures will involve additional Crown funding. Availability of funding will ultimately determine which measures are implemented, and the implementation timeframes. These will, in turn, determine the level of risk mitigation achieved.

Measures such as external washing, six-sided inspection and fumigation will remain as treatments for containers identified as high risk through the intelligence-based system, or for those found to be non-compliant during audit inspections. However, detection and removal of internal and external contaminants will occur as part of other mitigation measures, such as supervision of unpacking.

Shippers or importers will have the ability to propose alternative compliance systems which, if demonstrated to provide mitigation levels equivalent to existing systems, may be approved as exceptions by the Director, Border Management.

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Appendix 1. List of Organisms Found

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Birds						
Unknown	Unknown	Feather			34	Unknown
Centipedes						
Lithobius sp.		Centipede		1		Genus present in NZ
Flatworms	**Class: Order**					
Indet.	Turbellaria: Tricladia	Planarian (flatworm)	1			Order present in NZ
Fungi	**Order: Family**					
Absidia spinosa	Mucorales: Mucoraceae	Humus fungus	1			Present in NZ
Acremonium butyri	Ascomycete anamorph	Litter fungus	1			Present in NZ
Acremonium fusidioides	Hyphomycetales: Moniliaceae	Dung fungus	1			Regulated
Acremonium kiliense	Hyphomycetales: Moniliaceae	Human mycetoma	2			Regulated
Acremonium rutilum	Hyphomycetales: Moniliaceae	Litter fungus	1			Regulated
Acremonium sclerotigenum	Hyphomycetales: Moniliaceae	Soil fungus	1			Regulated

[27] Taxonomic information for fungi comes mainly from the Landcare Research database of fungi in New Zealand (Landcare Research 2002). Information for arthropods, seeds and plant material was provided by AgriQuality New Zealand Limited. New Zealand spider taxonomy is from Sirvid (in press) and the World Spider Catalog, http://research.amnh.org/entomology/spiders/catalog81-87/.

[28] See the definition of "regulated" in the terminology section. For organisms only identified to genus or family, the presence of genus or family in New Zealand has been noted. If the organism belongs to a genus or family with no members in New Zealand, it is a regulated organism. Non-regulated organisms are those formally assessed by MAF Plants Biosecurity as such, based on the MAF Plants Biosecurity Master Pest List. "Present in New Zealand" has been used for organisms in New Zealand that have not been formally assessed as non-regulated. Presence in New Zealand was provided by Landcare Research for fungi, insects and seeds, and was taken from Sirvid (in press) and Forster and Forster (1999) for spiders. Unknown has been used where a formal identification was not made, or where information is not available.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Acremonium strictum	Hyphomycetales: Moniliaceae	Black bundle disease	7			Non-regulated
Alternaria alternata	Hyphomycetales: Dematiaceae	Black mould , leaf spot	25			Non-regulated
Alternaria chlamydospora	Hyphomycetales: Dematiaceae	Black mould	1			Regulated
Alternaria phragmospora	Hyphomycetales: Dematiaceae	Soil mould	1			Regulated
Alternaria tenuissima	Hyphomycetales: Dematiaceae	Black mould	12			Non-regulated
Amorphotheca resinae	Helotiales: Amorphothecaceae	Kerosene fungus	1			Present in NZ
Apiospora montagnei	Sordariales: Lasiosphaeriaceae	Bamboo fungus	4			Non-regulated
Arthrobotrys arthrobotryoides	Hyphomycete anamorph	Nematode trapping fungus	2			Regulated
Arthrobotrys conoides	Hyphomycete anamorph	Nematode trapping fungus	1			Present in NZ
Aspergillus chevalieri	Hyphomycetales: Moniliaceae	Duck haemorrhagic fungus	1			Present in NZ
Aspergillus flavus	Hyphomycetales: Moniliaceae	Grain mould	1			Present in NZ
Aspergillus fumigatus	Hyphomycetales: Moniliaceae	Aspergillosis of humans	1			Present in NZ
Aspergillus glaucus	Hyphomycetales: Moniliaceae	Grain mould	1			Regulated
Aspergillus nidulans	Hyphomycetales: Moniliaceae	Soil mould	1			Regulated
Aspergillus niger	Hyphomycetales: Moniliaceae	Black mould	12			Present in NZ
Aspergillus parasiticus	Hyphomycetales: Moniliaceae	Grain mould	1			Regulated
Aspergillus sydowii	Hyphomycetales: Moniliaceae	Spoilage fungus	4			Present in NZ
Aspergillus ustus	Hyphomycetales: Moniliaceae	Soil mould	1			Regulated

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Aspergillus versicolor	Hyphomycetales: Moniliaceae	Peach soft mould	11			Present in NZ
Aureobasidium pullulans	Hyphomycete anamorph	Black yeast	21			Non-regulated
Bipolaris australiensis	Hyphomycetales: Dematiaceae	Helminthosporium crown rot	2			Non-regulated
Bipolaris hawaiiensis[29]	Pleosporales: Pleosporaceae	Seed mould	1			Non-regulated
Botryosphaeria dothidea	Dothideales: Botryosphaeriaceae	White rot of apple	4			Non-regulated
Botryosphaeria obtusa	Dothideales: Botryosphaeriaceae	Apple black rot canker	2			Non-regulated
Botryosphaeria parva	Dothideales: Botryosphaeriaceae	Black rot	1			Non-regulated
Botryosphaeria stevensii	Dothideales: Botryosphaeriaceae	Grape black dead arm	2			Non-regulated
Botryotrichum piluliferum[30]	Ascomycete anamorph	Dung fungus	2			Regulated
Botrytis cinerea	Ascomycete anamorph	Grey mould	1			Non-regulated
Candida parapsilosis	Hyphomycete anamorph	Human candidiasis	1			Non-regulated
Ceratocystis sp.	Microascales: Ceratocystidaceae	Canker	1			Genus present in NZ
Chaetomium abuense	Sordariales: Chaetomiaceae	Wood rot	1			Regulated
Chaetomium cupreum	Sordariales: Chaetomiaceae	Humus fungus	1			Regulated
Chaetomium elatum	Sordariales: Chaetomiaceae	Timber soft rot	2			Present in NZ
Chaetomium funicola	Sordariales: Chaetomiaceae	Humus fungus	4			Regulated

[29] This is the anamorph of *Pseudocochliobolus hawaiiensis* (Landcare Research 2002). *Pseudocochliobolus hawaiiensis* appears on the MAF Plants Biosecurity Master Pest List as non-regulated.

[30] Not listed in Landcare Research 2002.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Chaetomium globosum	Sordariales: Chaetomiaceae	Timber soft rot	3			Non-regulated
Chaetomium rectum	Sordariales: Chaetomiaceae	Leaf fungus	1			Present in NZ
Chaetomium spirale	Sordariales: Chaetomiaceae	Paper fungus	1			Present in NZ
Chaetomium virgecephalum	Sordariales: Chaetomiaceae	Leaf fungus	1			Present in NZ
Chaetopsis sp.	Hyphomycete anamorph	Bark fungus	1			Genus present in NZ
Chalara sp.	Hyphomycete anamorph	Timber blue stain	1			Genus present in NZ
Cladorrhinum sp.	Hyphomycete anamorph	Bung fungus	1			Genus present in NZ
Cladosporium cladosporioides	Hyphomycetales: Dematiaceae	Sooty mould	27			Non-regulated
Cladosporium herbarum	Hyphomycetales: Dematiaceae	Sooty mould	6			Non-regulated
Cladosporium macrocarpum	Hyphomycetales: Dematiaceae	Plant mould	1			Regulated
Cladosporium sphaerospermum	Hyphomycetales: Dematiaceae	Sooty mould	8			Non-regulated
Clethridium corticola[31]	Xylariales: Amphisphaeriaceae	Bark fungus	1			Non-regulated
Cochliobolus sativus	Dothideales: Pleosporaceae	Grass spot blotch	1			Non-regulated
Cryptosporiopsis sp.	Coelomycete anamorph	Bark fungus	1			Genus present in NZ
Curvularia eragrostidis	Hyphomycetales: Dematiaceae	Curvularia blight	4			Present in NZ
Curvularia fallax	Hyphomycetales: Dematiaceae	Leaf mould	1			Regulated

[31] This is a synonym of *Discostroma corticola* (Landcare Research 2002). *Discostroma corticola* appears in the MAF Plants Biosecurity Master Pest List as non-regulated.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Curvularia inequalis	Hyphomycetales: Dematiaceae	Grain fungus	1			Regulated
Curvularia lunata	Hyphomycetales: Dematiaceae	Curvularia blight	1			Non-regulated
Curvularia ovoidea	Hyphomycetales: Dematiaceae	Leaf mould	2			Regulated
Curvularia pallescens	Hyphomycetales: Dematiaceae	Leaf mould	2			Regulated
Cylindrocarpon didymum	Hypocreales: Hypocreaceae	Root rot	1			Non-regulated
Cylindrocarpon olidum	Hypocreales: Hypocreaceae	Root rot	1			Regulated
Cylindrocladiella camelliae	Hyphomycete anamorph	Root and collar rot of tea	1			Regulated
Cylindrosporium sp.	Coelomycete anamorph	Leaf fungus	2			Genus present in NZ
Cytospora sp.	Coelomycete anamorph	Branch canker	1			Genus present in NZ
Dactylaria sp.	Hyphomycete anamorph	Leaf fungus	1			Genus present in NZ
Dasyscyphus sp.	Helotiales: Hyaloscyphaceae	Bark fungus	1			Genus present in NZ
Dendrospora sp.	Hyphomycete anamorph	Pond leaf fungus	1			Genus present in NZ
Dinemasporium strigosum[32]	Coelomycete anamorph	Grass leaf fungus	1			Non-regulated
Diplodina sp.	Coelomycete anamorph	Leaf spot	1			Genus present in NZ
Drechslera dematioidea	Hyphomycetales: Dematiaceae	Leaf spot	1			Non-regulated
Epicoccum purpurascens[33]	Hyphomycetales: Dematiaceae	Sooty mould	14			Non-regulated

[32] This is an anamorph of *Phomatospora dinemasporium* (Landcare Research 2002). *Phomatospora dinemasporium* appears in the MAF Plants Biosecurity Master Pest List as non-regulated.
[33] This is a synonym of *Epicoccum nigrum* (Landcare Research 2002). *Epicoccum nigrum* appears in the MAF Plants Biosecurity Master Pest List as non-regulated.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Eupenicillium lapidosum	Eurotiales: Trichocomaceae	Orange-red mould	1			Regulated
Exophiala salmonis	Hyphomycete anamorph	Salmon granuloma	1			Regulated
Exserohilum rostratum	Hyphomycetales: Dematiaceae	Wheat foot rot	2			Non-regulated
Fusarium acuminatum	Tuberculariales: Tuberculariaceae	Root and stem rot	1			Non-regulated
Fusarium avenaceum	Tuberculariales: Tuberculariaceae	Seedling blight	4			Non-regulated
Fusarium equiseti	Tuberculariales: Tuberculariaceae	Root and stem rot	4			Non-regulated
Fusarium flocciferum	Tuberculariales: Tuberculariaceae	Potato black rot	1			Non-regulated
Fusarium graminearum	Tuberculariales: Tuberculariaceae	Crown rot, stalk rot	3			Non-regulated
Fusarium graminum	Tuberculariales: Tuberculariaceae	Paspalum fusarium	1			Present in NZ
Fusarium lateritium	Tuberculariales: Tuberculariaceae	Canker	11			Non-regulated
Fusarium oxysporum	Tuberculariales: Tuberculariaceae	Fusarium wilt	9			Non-regulated
Fusarium proliferatum	Tuberculariales: Tuberculariaceae	Leaf spot	2			Non-regulated
Fusarium sambucinum	Tuberculariales: Tuberculariaceae	Hop canker	3			Non-regulated
Fusarium semitectum	Tuberculariales: Tuberculariaceae	Storage rot	2			Present in NZ
Fusarium solani	Tuberculariales: Tuberculariaceae	Root rot	13			Non-regulated
Fusarium sporotrichioides	Tuberculariales: Tuberculariaceae	Wheat head mould	1			Non-regulated
Fusicoccum luteum	Ascomycete anamorph	Black rot	1			Non-regulated
Geotrichum candidum	Hyphomycetales: Moniliaceae	Sour rot	4			Non-regulated

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Geotrichum sp.	Hyphomycetales: Moniliaceae	Soil fungus	1			Genus present in NZ
Gliocladium penicillioides	Hyphomycetales: Moniliaceae	Litter fungus	1			Present in NZ
Gliocladium roseum	Hyphomycetales: Moniliaceae	Carrot hard rot	1			Non-regulated
Gliocladium virens	Hyphomycetales: Moniliaceae	Bog fungus	1			Regulated
Gliocladium viride	Hyphomycetales: Moniliaceae	Green mould	2			Non-regulated
Glomerella cingulata	Phyllachorales: Phyllachoraceae	Anthracnose	4			Non-regulated
Graphium sp.	Hyphomycete anamorph	Blue stain	3			Genus present in NZ
Guignardia sp.	Dothideales: Mycosphaerellaceae	Black spot, Black rot	1			Genus present in NZ
Harknessia uromycoides	Coelomycete anamorph	Eucalyptus leaf fungus	1			Regulated
Hormonema dematioides[34]	Dothideales: Dothioraceae	Black yeast	4			Non-regulated
Humicola fusco-atra	Hyphomycete anamorph	Humus fungus	1			Regulated
Hyalodendron sp.	Hyphomycete anamorph	Litter fungus	3			Regulated
Khuskia oryzae	Sphaeriales	Nigrospora cob rot	2			Non-regulated
Kickxella sp.	Kickxellales: Kickxellaceae	Dung fungus	5			Regulated
Lasiodiplodia theobromae	Sphaeropsidales: Sphaerioidaceae	Java black rot	1			Non-regulated
Lecythophora sp.	Hyphomycete anamorph	Bark fungus	2			Genus present in NZ
Leptographium sp.	Hyphomycete anamorph	Sapwood stain	1			Genus present in NZ

[34] This is an anamorph of *Sydowia polyspora* (Landcare Research 2002), which appears in the MAF Plants Biosecurity Master Pest List as non-regulated.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Leptosphaeria coniothyrium[35]	Pleosporales: Leptosphaeriaceae	Raspberry cane blight	1			Non-regulated
Microdiplodia sp.	Coelomycete anamorph	Die back	3			Genus present in NZ
Microdochium bolleyi	Hyphomycete anamorph	Root rot	1			Present in NZ
Microsphaeropsis arundinis	Coelomycete anamorph	Reed fungus	4			Regulated
Microsphaeropsis globulosa	Coelomycete anamorph	Leaf spot	1			Regulated
Microsphaeropsis olivacea	Coelomycete anamorph	Leaf spot	5		1	Regulated
Microsphaeropsis sp.	Coelomycete anamorph	Leaf spot	1		1	Genus present in NZ
Mortierella isabellina	Mucorales: Mortierellaceae	Litter fungus	2			Regulated
Mortierella ramanniana f. *ramanniana*[36]	Mucorales: Mortierellaceae	Litter fungus	1			Present in NZ
Mucor hiemalis f. *corticola*[37]	Mucorales: Mucoraceae	Litter fungus	1			Unknown
Mucor hiemalis f. *hiemalis*[38]	Mucorales: Mucoraceae	Mucor rot	6			Unknown
Mucor plumbeus	Mucorales: Mucoraceae	Mucor rot	5			Present in NZ
Mucor racemosus f. *racemosus*[39]	Mucorales: Mucoraceae	Mucor rot	1			Unknown
Mucor racemosus f. *spharoioides*[40]	Mucorales: Mucoraceae	Mucor rot	1			Unknown

[35] This is listed as the teleomorph of *Coniothyrium fuckelii* in Landcare Research (2002), which appears in the MAF Plants Biosecurity Master Pest List as non-regulated.
[36] *Mortierella ramanniana* appears in Landcare Research (2002) as present in New Zealand; this subspecies is not mentioned.

[37] Presence of this subspecies in New Zealand is not recorded in Landcare Research (2002), nor has it been assessed by MAF Plants Biosecurity. Therefore, status is listed as unknown.
[38] Presence of this subspecies in New Zealand is not recorded in Landcare Research (2002), nor has it been assessed by MAF Plants Biosecurity. Therefore, status is listed as unknown.
[39] Presence of this subspecies in New Zealand is not recorded in Landcare Research (2002), nor has it been assessed by MAF Plants Biosecurity. Therefore, status is listed as unknown.
[40] Presence of this subspecies in New Zealand is not recorded in Landcare Research (2002), nor has it been assessed by MAF Plants Biosecurity. Therefore, status is listed as unknown.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Nectria inventa	Hypocreales: Hypocreaceae	Ginger red rot	1		1	Non-regulated
Nectria radicicola	Hypocreales: Hypocreaceae	Root rot	1			Non-regulated
Neocosmospora vasinfecta	Hypocreales: Hypocreaceae	Soybean root rot	1			Regulated
Nigrospora sphaerica	Hyphomycetales: Dematiaceae	Niagrospora rot	8		1	Non-regulated
Oidiodendron sp.	Hyphomycete anamorph	Humus fungus	2			Genus present in NZ
Oidiodendron tenuissimum	Hyphomycete anamorph	Humus fungus	1			Regulated
Ophiostoma sp.	Ophiostomatales: Ophiostomataceae	Blue stain, wilt	3			Genus present in NZ
Paecilomyces variotii	Hyphomycete anamorph	Spoilage fungus	11			Non-regulated
Panellus mitis	Agaricales: Tricholomataceae	Conifer bark fungus			2	Regulated
Papulaspora immersa	Hyphomycete anamorph	Dung fungus	1			Regulated
Papulaspora irregularis	Hyphomycete anamorph	Dung fungus	4			Regulated
Penicillium atrovenetum	Hyphomycetales: Moniliaceae	Grain soil mould	1			Regulated
Penicillium brevicompactum	Hyphomycetales: Moniliaceae	Maize spoilage	9			Present in NZ
Penicillium canescens	Hyphomycetales: Moniliaceae	Bridge paint spoiler	13			Regulated
Penicillium chermesianum	Hyphomycetales: Moniliaceae	Green mould	7			Regulated
Penicillium chrysogenum	Hyphomycetales: Moniliaceae	Green mould	3			Present in NZ
Penicillium citreonigrum	Hyphomycetales: Moniliaceae	Human cardiac beriberi	3			Present in NZ
Penicillium citrinum	Hyphomycetales: Moniliaceae	Green mould	16		1	Present in NZ

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Penicillium corylophilum	Hyphomycetales: Moniliaceae	Green mould	5			Present in NZ
Penicillium cyclopium	Hyphomycetales: Moniliaceae	Hyacinth bulb rot	3			Present in NZ
Penicillium decumbens	Hyphomycetales: Moniliaceae	Litter mould	3			Present in NZ
Penicillium digitatum	Hyphomycetales: Moniliaceae	Citrus blue mould rot	3			Present in NZ
Penicillium echinulatum	Hyphomycetales: Moniliaceae	Seed mould	2			Regulated
Penicillium fellutanum	Hyphomycetales: Moniliaceae	Blue-green mould	7			Present in NZ
Penicillium frequentans	Hyphomycetales: Moniliaceae	Grain mould	7		1	Present in NZ
Penicillium funiculosum	Hyphomycetales: Moniliaceae	Glasiolus corm rot	2			Regulated
Penicillium herquei	Hyphomycetales: Moniliaceae	Cotton mould	2			Present in NZ
Penicillium islandicum	Hyphomycetales: Moniliaceae	Yellow rice fungus	1			Regulated
Penicillium janthinellum	Hyphomycetales: Moniliaceae	Grey-green mould	7			Present in NZ
Penicillium lividum	Hyphomycetales: Moniliaceae	Peat bog fungus	1			Present in NZ
Penicillium nigricans	Hyphomycetales: Moniliaceae	Grey-green mould	5			Present in NZ
Penicillium oxalicum	Hyphomycetales: Moniliaceae	Maize seed rot	7			Regulated
Penicillium purpurogenum	Hyphomycetales: Moniliaceae	Soil fungus	1			Present in NZ
Penicillium restrictum	Hyphomycetales: Moniliaceae	Grey-brown mould	3			Present in NZ
Penicillium rugulosum	Hyphomycetales: Moniliaceae	Mouldy hay fungus	2			Present in NZ
Penicillium simplicissimum	Hyphomycetales: Moniliaceae	Blue mould	15			Present in NZ

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Penicillium spinulosum	Hyphomycetales: Moniliaceae	Leaf litter mould	5			Present in NZ
Penicillium steckii	Hyphomycetales: Moniliaceae	Litter mould	1			Regulated
Penicillium stoloniferum	Hyphomycetales: Moniliaceae	Poinsettia flower blight	1			Present in NZ
Penicillium variabile	Hyphomycetales: Moniliaceae	Wilt fungus	4			Regulated
Penicillium verrucosum	Hyphomycetales: Moniliaceae	Grain mould	1			Regulated
Penicillium viridicatum	Hyphomycetales: Moniliaceae	Grain mould	1			Present in NZ
Pesotum sp.	Hyphomycete anamorph	Wilt fungus	1			Genus present in NZ
Pestalotiopsis funerea	Coelomycete anamorph	Needle blight	4			Non-regulated
Pestalotiopsis maculans	Coelomycete anamorph	Leaf spot	2			Non-regulated
Pestalotiopsis sp.	Coelomycete anamorph	Leaf spot	1			Genus present in NZ
Pestalotiopsis uvicola	Coelomycete anamorph	Leaf spot	1			Regulated
Phacidium coniferarum[41]	Helotiales: Phacidiaceae	Pine canker	3			Non-regulated
Phaeoacremonium parasiticum[42]	Hyphomycetales: Dematiaceae	Oak decline	1			Regulated
Phaeoacremonium sp.	Hyphomycetales: Dematiaceae	Tree wilts, human keratitis	1			Genus present in NZ
Phaeoseptoria sp.	Sphaeropsidales: Sphaerioidaceae	Bark fungus	1			Genus present in NZ
Phialophora bubakii	Hyphomycetales: Dematiaceae	Wood rot	3			Regulated

[41] This is the telomorph of *Phacydiopycnis pseudotsugae* (Landcare Research 2002), which appears in the MAF Plants Biosecurity Master Pest List as non-regulated.
[42] This is a synonym of *Phialophora parasitica* (Landcare Research 2002), which appears in the MAF Plants Biosecurity Master Pest List as regulated.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Phialophora fastigiata	Hyphomycetales: Dematiaceae	Wood rot	1			Non-regulated
Phialophora melinii	Hyphomycetales: Dematiaceae	Wood rot	2			Regulated
Phoma chrysanthemicola	Sphaeropsidales: Sphaerioidaceae	Chrysanthemum root rot	1			Non-regulated
Phoma epicoccina	Sphaeropsidales: Sphaerioidaceae	Seed mould	2			Regulated
Phoma eupyrena	Sphaeropsidales: Sphaerioidaceae	Leaf spot	1			Non-regulated
Phoma exigua	Sphaeropsidales: Sphaerioidaceae	Leaf spot	1			Non-regulated
Phoma fimeti	Sphaeropsidales: Sphaerioidaceae	Leaf rot	1			Non-regulated
Phoma glomerata	Sphaeropsidales: Sphaerioidaceae	Leaf blight of wheat	3			Non-regulated
Phoma herbarum	Sphaeropsidales: Sphaerioidaceae	Wood rot	5			Regulated
Phoma leveillei	Sphaeropsidales: Sphaerioidaceae	Wood rot	4			Non-regulated
Phoma macrostoma	Sphaeropsidales: Sphaerioidaceae	Apple fruit spot	4			Non-regulated
Phoma nebulosa[43]	Sphaeropsidales: Sphaerioidaceae	Nettle fungus	2			Non-regulated
Phoma pomorum	Sphaeropsidales: Sphaerioidaceae	Apple fruit spot	1			Non-regulated
Phoma putaminum	Sphaeropsidales: Sphaerioidaceae	Litter fungus	1			Regulated
Phoma sp.	Sphaeropsidales: Sphaerioidaceae	Leaf spot	3			Genus present in NZ
Phoma tropica	Sphaeropsidales: Sphaerioidaceae	Leaf fungus	1			Regulated
Phomopsis sp.	Sphaeropsidales: Sphaerioidaceae	Stem canker	1			Genus present in NZ

[43] This is an anamorph of *Mycosphaerella nebulosa* (Landcare Research 2002), which appears in the MAF Plants Biosecurity Master Pest List as non-regulated.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Pithomyces atro-olivaceus	Hyphomycete anamorph	Acacia mould	1			Regulated
Pithomyces chartarum	Hyphomycete anamorph	Facial eczema fungus	5			Non-regulated
Pithomyces cynodontis	Hyphomycete anamorph	Leaf mould	1			Regulated
Pithomyces maydicus	Hyphomycete anamorph	Litter mould	1			Regulated
Plectosphaerella cucumerina	Phyllachorales[44]:	Cucumber wilt	1			Present in NZ
Pleospora allii	Dothideales: Pleosporaceae	Leek leaf blight	4			Non-regulated
Pleospora herbarum	Dothideales: Pleosporaceae	Leaf mould	2			Non-regulated
Pleospora tarda	Dothideales: Pleosporaceae	Leaf spot	1			Non-regulated
Pseudogliomastix sp.	Hypocreales: Niessliaceae	Wood fungus	1			Genus present in NZ
Pseudogymnoascus roseus	Onygenales: Myxotrichaceae	Soil litter fungus	1			Present in NZ
Pyrenochaeta fallax	Sphaeropsidales: Sphaerioidaceae	Nettle fungus	1			Regulated
Pyrenochaeta sp.	Sphaeropsidales: Sphaerioidaceae	Root fungus	1			Genus present in NZ
Pythium sp.	Pythiales: Pythiaceae	Root rot	1			Genus present in NZ
Rhizoctonia sp.	Hyphomycete anamorph	Root rot, stem rot	7			Genus present in NZ
Rhizomucor pusillus[45]	Mucorales: Mucoraceae	Mastitis	6			Present in NZ
Rhizopus microsporus	Mucorales: Mucoraceae	Human phycomycosis	1			Non-regulated

[44] The genus *Plectosphaerella* has not been assigned to a family within the order Phyllachorales in Landcare Research (2002).
[45] Reported in NZ by Austwick (1976), but not listed as present in NZ in Landcare Research (2002).

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Rhizopus oryzae[46]	Mucorales: Mucoraceae	Rhizopus rot	5			Non-regulated
Rhizopus rhizopodiformis	Mucorales: Mucoraceae	Animal/human phycomycosis	1			Regulated
Rhizopus stolonifer	Mucorales: Mucoraceae	Rhizopus rot	10			Non-regulated
Schizophyllum commune	Schizophyllales: Schizophyllaceae	Wound rot	4			Non-regulated
Sclerotium sp.	Hyphomycete anamorph	Plant rot	2			Genus present in NZ
Scolecobasidium constricum	Hyphomycete anamorph	Nematode parasite	1			Regulated
Scopulariopsis brevicaulis	Hyphomycete anamorph	Cheese spoilage fungus	2			Non-regulated
Scopulariopsis candida	Hyphomycete anamorph	Human granulomas	1			Present in NZ
Sordaria fimicola	Sordariales: Sordariaceae	Dung fungus	2			Non-regulated
Sphaeropsis sapinea	Sphaeropsidales: Sphaerioidaceae	Pine bleeding canker	6			Non-regulated
Sphaeropsis sp.	Sphaeropsidales: Sphaerioidaceae	Tree branch fungus	1			Genus present in NZ
Sporobolomyces sp.	Hyphomycete anamorph	Yeast	1			Genus present in NZ
Sporothrix sp.	Hyphomycete anamorph	Sporothrides (human)	1			Genus present in NZ
Talaromyces sp.	Eurotiales: Trichocomaceae	Blue mould	1			Genus present in NZ
Torula herbarum	Hyphomycete anamorph	Stem fungus	1			Regulated
Trametes versicolor	Poriales: Coriolaceae	White wound rot	2			Non-regulated
Trichocladium basicola[47]	Hyphomycetales: Dematiaceae	Black root rot	2			Non-regulated

[46] This is synonymised with *Rhizopus arrhizus* (Landcare Research 2002), which appears in the MAF Plants Biosecurity Master Pest List as non-regulated.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Trichoderma hamatum	Hyphomycetales: Moniliaceae	Soil fungus	1			Regulated
Trichoderma harzianum	Hyphomycetales: Moniliaceae	Trichoderma rot	27			Non-regulated
Trichoderma koningii[48]	Hyphomycetales: Moniliaceae	Litter fungus	7			Non-regulated
Trichoderma piluliferum	Hyphomycetales: Moniliaceae	Litter fungus	2			Regulated
Trichoderma polysporum	Hyphomycetales: Moniliaceae	Litter fungus	1			Non-regulated
Trichoderma pseudokoningii	Hyphomycetales: Moniliaceae	Litter fungus	1			Present in NZ
Trichoderma viride	Hyphomycetales: Moniliaceae	Trichoderma rot	8			Non-regulated
Trichosporon beigelii[49]	Hyphomycete anamorph	White piedra (human)	1			Present in NZ
Trichosporon sp.	Hyphomycete anamorph	Soil yeast	2			Genus present in NZ
Trichothecium roseum	Hyphomycete anamorph	Pink mould rot	1			Non-regulated
Tritirachium sp.	Hyphomycete anamorph	Litter fungus	1			Genus present in NZ
Ulocladium atrum	Hyphomycetales: Dematiaceae	Fruit mould	5			Non-regulated
Ulocladium chartarum	Hyphomycetales: Dematiaceae	Litter fungus	1			Non-regulated
Ulocladium consortiale	Hyphomycetales: Dematiaceae	Litter fungus	2			Non-regulated
Ulocladium oudemansii	Hyphomycetales: Dematiaceae	Wood stain	4			Regulated

[47] This is a synonym of *Thielaviopsis basicola (*Landcare Research 2002), which appears in the MAF Plants Biosecurity Master Pest List as non-regulated.

[48] This is an anamorph of *Hypocrea ceramica* (Landcare Research 2002), which appears in the MAF Plants Biosecurity Master Pest List as non-regulated.
[49] A dubious name, usually synonymised with *Trichosporon cutaneum* (Landcare Research evaluation).

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Verticillium lecanii	Hyphomycetales: Moniliaceae	Insect pathogen	1			Non-regulated
Zygosporium masonii	Hyphomycetales: Moniliaceae	Rush fungus	2			Regulated
Zygosporium mycophilum	Hyphomycetales: Moniliaceae	Leaf decay fungus	1		1	Regulated
Not sent for ID	Unknown	Black mould			3	Unknown
Not sent for ID	Unknown	White mould			2	Unknown
Not sent for ID	Unknown	Green mould			1	Unknown
Not sent for ID	Unknown	Unknown fungus	1		151	Unknown
Insects	**Order: Family**					
Adalia sp.	Coleoptera: Coccinellidae	Ladybird		1		Genus present in NZ
Acheta sp.	Orthoptera: Gryllidae	House cricket		1		Regulated
Agrotis ipsilon	Lepidoptera: Noctuidae	Greasy cutworm		2		Non-regulated
Agrotis munda	Lepidoptera: Noctuidae	Brown cutworm		1	1	Regulated
Agrotis sp.	Lepidoptera: Noctuidae	Cutworm moth		5		Genus present in NZ
Ahasverus advena	Coleoptera: Silvanidae	Foreign grain beetle	2	1		Non-regulated
Alphitobius diaperinus	Coleoptera: Tenebrionidae	Lesser mealworm		1		Non-regulated
Anomala sp.	Coleoptera: Scarabaeidae	Scarab beetle		1		Regulated
Anopheles sp.	Diptera: Culicidae	Mosquito		1		Regulated
Anthicus sp.	Coleoptera: Anthicidae	Ant-like flower beetle		1		Genus present in NZ

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Anthrenus muscorum	Coleoptera: Dermestidae	Museum beetle	1			Regulated
Anthrenus sp.	Coleoptera: Dermestidae	Museum beetle		1		Genus present in NZ
Anthrenus verbasci	Coleoptera: Dermestidae	Varied carpet beetle		1		Non-regulated
Arhopalus tristis	Coleoptera: Cerambycidae	Burnt pine longhorn	1			Non-regulated
Aridius nodifer	Coleoptera: Corticariidae	Minute scavenger beetle	3			Non-regulated
Atheta sp.	Coleoptera: Staphylinidae	Rove beetle	1	1		Regulated
Blaps sp.	Coleoptera: Tenebrionidae	Darkling beetle		1		Regulated
Blastobasis sp.	Lepidoptera: Blastobasidae	Moth larva	1			Genus present in NZ
Blatta orientalis	Blatodea: Blattidae	Oriental cockroach		1		Regulated
Blattella germanica	Blatodea: Blattellidae	German cockroach	1	4		Non-regulated
Braconinae	Hymenoptera: Braconidae	Parasitic wasp		1		Subfamily present in NZ
Bradysia sp.	Diptera: Sciaridae	Dark winged fungus gnat	6	2		Genus present in NZ
Calliphora vicina	Diptera: Calliphoridae	Blow fly	1			Non-regulated
Camponotus sp.	Hymenoptera: Formicidae	Carpenter ant	2	1	1	Genus present in NZ
Cartodere constricta	Coleoptera: Cortinicariidae	Plaster beetle	1			Regulated
Chironomus sp.	Diptera: Chironomidae	Midge		1		Genus present in NZ
Chironomus zealandicus	Diptera: Chironomidae	Midge	1			Non-regulated
Chrysopa sp.	Neuroptera: Chrysopidae	Lacewing		1		Genus present in NZ

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Clivina sp.	Coleoptera: Carabidae	Ground beetle		1		Genus present in NZ
Cnemodinus sp.	Coleoptera: Tenebrionidae	Darkling beetle		1		Regulated
Coccinella undeimpunctata	Coleoptera: Coccinellidae	11-spot ladybird		1		Non-regulated
Coleophora inaequalis	Coleoptera: Coccinellidae	Ladybird		1		Non-regulated
Conoderus sp.	Coleoptera: Elateridae	Click beetle			1	Genus present in NZ
Crematogaster sp.[50]	Hymenoptera: Formicidae	Acrobat ant	1			Regulated
Cryptolestes sp.	Coleoptera: Cucujidae	Flat grain beetle		1		Genus present in NZ
Cryptophagus cellaris	Coleoptera: Cryptophagidae	Cellar beetle	1			Regulated
Cryptophagus sp.	Coleoptera: Cryptophagidae	Fungus beetle		2		Genus present in NZ
Culex halifaxii	Diptera: Culicidae	Mosquito		1		Regulated
Culex pervigilans	Diptera: Culicidae	Mosquito	1			Non-regulated
Culex sp.	Diptera: Culicidae	Mosquito	3	2		Genus present in NZ
Cyclocephala sp.	Coleoptera: Scarabaeidae	Scarab beetle			1	Regulated
Cymodema sp.	Heteroptera: Lygaeidae	Seed bug		1		Regulated
Cynaeus sp.	Coleoptera: Tenebrionidae	Darkling beetle		2		Regulated
Dermestes maculatus	Coleoptera: Dermestidae	Hide beetle	1			Non-regulated
Dermestes sp.	Coleoptera: Dermestidae	Dermestid larvae	1			Genus present in NZ

[50] This interception was of a live ant nest, found at a door inspection inside a container of laundry equipment from China. This genus of ant is not present in New Zealand.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Dicaelus sp.	Coleoptera: Carabidae	Ground beetle		1		Regulated
Dindymus versicolor	Hemiptera: Pyrrhocoridae	Harlequin bug		1		Regulated
Doru taeniatum	Dermaptera: Forficulidae	Earwig		1		Regulated
Drosophila melanogaster	Diptera: Drosophilidae	Vinegar fly		1		Non-regulated
Drosophila sp.	Diptera: Drosophilidae	Vinegar fly		3		Genus present in NZ
Ectopsocus briggsi	Psocoptera: Ectopsocidae	Booklouse		1		Non-regulated
Ectopsocus sp.	Psocoptera: Ectopsocidae	Psocid	1			Genus present in NZ
Elephantodeta sp.	Orthoptera: Tettigoniidae	Bush katydid		1		Regulated
Entomobrya sp.	Collembola: Entomobryiidae	Springtail	1			Genus present in NZ
Erthesina sp.	Hemiptera: Pentatomidae	Shield bug		1		Regulated
Eumenes sp.	Hymenoptera: Vespidae	Solitary wasp		1		Regulated
Eumerus strigatus	Diptera: Syrphidae	Onion bulb fly		1		Non-regulated
Eurymela fenestrata	Hemiptera: Eurymelidae	Eurymelid bug		1		Regulated
Falagria sp.	Coleoptera: Staphylinidae	Rove beetle		1		Genus present in NZ
Forficula auricularia	Dermaptera: Forficulidae	European earwig	1			Non-regulated
Formica sp.	Hymenoptera: Formicidae	Wood ant		1		Regulated
Gonocephalum sp.	Coleoptera: Tenebrionidae	Darkling beetle		1		Genus present in NZ
Graphania mutans	Lepidoptera: Noctuidae	Armyworm		1		Non-regulated

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Gryllodes sigillatus	Orthoptera: Gryllidae	Cricket		1		Regulated
Gryllodes sp.	Orthoptera: Gryllidae	Cricket		1		Genus present in NZ
Harpalus sp.	Coleoptera: Carabidae	Ground beetle		1		Genus present in NZ
Heliothis sp.	Lepidoptera: Noctuidae	Fruitworm moth		1		Genus present in NZ
Heterobostrychus aequalis	Coleoptera: Bostrychidae	Lesser auger beetle		3		Regulated
Heteronychus arator	Coleoptera: Scarabaeidae	Black beetle		2		Non-regulated
Indet.	Blattodea: Blattellidae	Cockroach		1		Family present in NZ
Indet.	Blattodea: Blattidae	Cockroach	2			Family present in NZ
Indet.	Coleoptera: Carabidae	Ground beetle		1		Family present in NZ
Indet.	Coleoptera: Cerambycidae	Longhorned beetle		2		Family present in NZ
Indet.	Coleoptera: Corticariidae	Minute scavenger beetle			1	Family present in NZ
Indet.	Coleoptera: Corylophidae	Hooded beetle	1	1		Family present in NZ
Indet.	Coleoptera: Elateridae	Wireworm fragments			1	Family present in NZ
Indet.	Coleoptera: Histeridae	Predatory beetle	1			Family present in NZ
Indet.	Coleoptera: Oedemeriadae	Pollen-feeding beetle		1		Family present in NZ
Indet.	Coleoptera: Silphidae	Carrion beetle	1			Regulated
Indet.	Coleoptera: Staphylinidae	Rove beetle	3	1		Family present in NZ
Indet.	Coleoptera: Tenebrionidae	Darkling beetle		1		Family present in NZ

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Indet.	Coleoptera: Trogossitidae	Bark-gnawing beetle		1		Family present in NZ
Indet.	Collembola: Indet.	Springtail		1		Order present in NZ
Indet.	Collembola: Entomobryiidae	Springtail		1		Family present in NZ
Indet.	Dermaptera: Indet.	Earwig		1		Order present in NZ
Indet.	Dermaptera: Chelisochidae	Earwig	1			Family present in NZ
Indet.	Dermaptera: Pygidicranidae	Earwig		1		Regulated
Indet.	Diptera: Calliphoridae	Blowfly (pupal cases)		1		Family present in NZ
Indet.	Diptera: Cecidomyiidae	Gall midge	2			Family present in NZ
Indet.	Diptera: Chironomidae	Midge	1	1	1	Family present in NZ
Indet.	Diptera: Culicidae	Mosquito fragments		1		Family present in NZ
Indet.	Diptera: Empididae	Predatory fly (fragments)		1		Family present in NZ
Indet.	Diptera: Helcomyzidae	Fly		2		Family present in NZ
Indet.	Diptera: Muscidae	Fly		1		Family present in NZ
Indet.	Diptera: Mycetophilidae	Fungus gnat	2	2		Family present in NZ
Indet.	Diptera: Phoridae	Humpbacked fly	3	3	1	Family present in NZ
Indet.	Diptera: Psychodidae	Moth fly		1		Family present in NZ
Indet.	Diptera: Sciaridae	Dark-winged fungus gnat		1		Family present in NZ
Indet.	Diptera: Stratiomyidae	Rat-tailed maggot		1		Family present in NZ

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Indet.	Diptera: Stratiomyidae	Soldier fly larva		1		Family present in NZ
Indet.	Diptera: Tethinidae	Seashore fly		1		Family present in NZ
Indet.	Diptera: Tipulidae	Crane fly	2	2		Family present in NZ
Indet.	Hemiptera: Nabidae	Predatory bug			1	Family present in NZ
Indet.	Hemiptera: Pentatomidae	Stink bug		1		Family present in NZ
Indet.	Hemiptera: Reduviidae	Assassin bug		1		Family present in NZ
Indet.	Homoptera: Cicadellidae	Leafhopper		1		Family present in NZ
Indet.	Homoptera: Delphacidae	Planthopper		1		Family present in NZ
Indet.	Hymenoptera: Formicidae	Ant		2		Family present in NZ
Indet.	Hymenoptera: Ichneumonidae	Wasp		1		Family present in NZ
Indet.	Lepidoptera: Cosmopterygidae	Leaf miner moth		1		Family present in NZ
Indet.	Lepidoptera: Geometridae	Looper moth	1	1	1	Family present in NZ
Indet.	Lepidoptera: Lasiocampidae	Moth		1		Regulated
Indet.	Lepidoptera: Noctuidae	Owl moth	1	1		Family present in NZ
Indet.	Lepidoptera: Psychidae	Bag moth		1		Family present in NZ
Indet.	Lepidoptera: Pyralidae	Pyralid moth	1	5		Family present in NZ
Indet.	Lepidoptera: Tineidae	Moth (fragments)		1		Family present in NZ
Indet.	Lepidoptera: Yponomeutidae	Moth (damaged)		1		Family present in NZ

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Indet.	Lepidoptera: Zygaenidae	Forester moth		1		Family present in NZ
Indet.	Mantodea: Mantidae	Praying mantis		1		Probably not a NZ species
Indet.	Neuroptera: Hemerobiidae	Lacewing	1			Family present in NZ
Indet.	Orthoptera: Tettigoniidae	Longhorned grasshopper		3		Family present in NZ
Indet.	Psocoptera: indet	Barklouse		1		Order present in NZ
Indet.	Trichoptera: indet	Caddisfly		2		Order present in NZ
Indet.	Indet.	Larva			1	Unknown
Iridomyrmex sp.	Hymenoptera: Formicidae	Meat ant	2	2		Regulated
Labidura sp.	Dermaptera: Labiduridae	Earwig		1		Genus present in NZ
Lachesilla sp.	Psocoptera: Lachesillidae	Grain psocid	1			Regulated
Lachesillia pedicularia	Psocoptera: Lachesillidae	Grain psocid	1			Regulated
Lasioderma serricorne	Coleoptera: Anobiidae	Tobacco beetle	1			Non-regulated
Lasioglossum sp.	Hymenoptera: Halictidae	Solitary bee		1		Genus present in NZ
Lecanomerus sp.	Coleoptera: Carabidae	Ground beetle		1		Genus present in NZ
Leptocera sp.	Diptera: Sphaeroceridae	Dung fly	2	1		Genus present in NZ
Limoniinae	Diptera: Tipulidae	Crane fly		1		Subfamily present in NZ
Linepithema humile	Hymenoptera: Formicidae	Argentine ant	1			Non-regulated
Liposcelis entomophilus	Psocoptera: Liposcelidae	Grain psocid	2			Regulated

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Liposcelis liparius	Psocoptera: Liposcelidae	Booklouse	1			Regulated
Liposcelis sp.	Psocoptera: Liposcelidae	Booklouse	1			Genus present in NZ
Mantinae	Mantodea: Mantidae	Praying mantis		1		Subfamily present in NZ
Mayriella sp.	Hymenoptera: Formicidae	Ant	1			Genus present in NZ
Mecyclothorax ambiguus	Coleoptera: Carabidae	Ground beetle		1		Non-regulated
Melolonthinae	Coleoptera: Scarabaeidae	Chafer beetle		1	1	Subfamily present in NZ
Metopiinae	Hymenoptera: Ichneumonidae	Ichneumon wasp		1		Subfamily present in NZ
Metopina sp.	Diptera: Phoridae	Scuttle fly	1			Genus present in NZ
Micromalthus debilis	Coleoptera: Micromalthidae	Telephone pole beetle		1		Regulated
Miomantis caffra	Mantodea: Mantidae	South African mantis	1			Non-regulated
Musca domestica	Diptera: Muscidae	House fly		5		Non-regulated
Musca sp.	Diptera: Muscidae	Muscid fly		7		Genus present in NZ
Muscina stabulans	Diptera: Muscidae	False stable fly		2		Non-regulated
Mythimna separata	Lepidoptera: Noctuidae	Cosmopolitan armyworm	1			Non-regulated
Nabis sp.	Hemiptera: Nabidae	Predatory bug			1	Genus present in NZ
Necrobia rufipes	Coleotera: Cleridae	Red-legged ham beetle			1	Non-regulated
Nemapogon sp.	Lepidoptera: Tineidae	Clothes moth		1		Genus present in NZ
Neostylopyga rhombifolia	Blattodea: Blattidae	Harlequin cockroach		1		Regulated

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Neotermes sp.	Isoptera: Kalotermitidae	Termite		1		Regulated
Neottiglossa undata	Hemiptera: Pentatomidae	Stink bug	1			Regulated
Netelia sp.	Hymenoptera: Ichneumonidae	Ichneumon wasp			1	Genus present in NZ
Neurogalesus sp.	Hymenoptera: Diapriiadae	Parasitic wasp	1			Genus present in NZ
Nezara viridula	Hemiptera: Pentatomidae	Green vegetable bug		2		Non-regulated
Nysius sp.	Hemiptera: Lygaeidae	Seed bug		1		Genus present in NZ
Nysius vinitor	Hemiptera: Lygaeidae	Rutherglen bug		1		Regulated
Ochetellus glaber	Hymenoptera: Formicidae	Black house ant	2			Non-regulated
Ophioninae	Hymenoptera: Ichneumonidae	Ichneumon wasp	1			Subfamily present in NZ
Opogona sp.	Lepidoptera: Tineidae	Detritus moth		1		Genus present in NZ
Orocrambus flexuosellus	Lepidoptera: Pyralidae	Grass moth	1			Non-regulated
Paratrechina sp.	Hymenoptera: Formicidae	Flower ant	3	1		Genus present in NZ
Periplaneta americana	Blattodea: Blattidae	American cockroach	2	1		Non-regulated
Periplaneta australasiae	Blattodea: Balttidae	Australian cockroach	1			Non-regulated
Periplaneta sp.	Blattodea: Blattidae	Cockroach	1		1	Genus present in NZ
Pheidole sp.	Hymenoptera: Formicidae	Big headed ant		6	1	Genus present in NZ
Phyllophaga sp.	Coleoptera: Scarabaeidae	Scarab beetle		1		Regulated
Plodia interpunctella	Lepidoptera: Pyralidae	Indian meal moth	1			Non-regulated

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Ploiara sp.	Hemiptera: Reduviidae	Thread-legged bug	1			Regulated
Polistes chinensis	Hymenoptera: Vespidae	Asian paper wasp	1	1		Non-regulated
Polistes sp.	Hymenoptera: Vespidae	Paper wasp nest		1		Genus present in NZ
Prosapia sp.	Homoptera: Cicadellidae	Plant hopper		1		Regulated
Rhipicera sp.	Coleoptera: Rhipiceridae	Cicada parasite beetle			1	Regulated
Rhizopertha dominica[51]	Coleoptera: Bostrychidae	Lesser grain borer		1		Regulated
Rhyparochrominae	Hemiptera: Lygaeidae	Seed bug		1		Subfamily present in NZ
Rhytidoponera sp.	Hymenoptera: Formicidae	No common name		2		Genus present in NZ
Saprosites sp.	Coleoptera: Scarabaeidae	Scarab beetle		2		Genus present in NZ
Sarcophaga sp.	Diptera: Sarcophagidae	Flesh fly	1	2		Genus present in NZ
Scaptomyza sp.	Diptera: Drosophillidae	Leafmining vinegar fly	1			Genus present in NZ
Scatopse sp.	Diptera: Scaraptopsidae	Compost fly		1		Genus present in NZ
Sceliphronini	Hymenoptera: Sphecidae	Mud dauber wasp pupa		1		Regulated
Sciara sp.	Diptera: Sciaridae	dark winged fungus gnat	1	2		Genus present in NZ
Scolytus sp.	Coleotera: Scolytidae	Bark beetle		3		Genus present in NZ
Sericoderus sp.	Coleoptera: Corylophidae	Hooded beetle	1			Genus present in NZ
Silvanus muticus	Coleoptera: Silvanidae	Flat bark beetle	2			Regulated

[51] This species has been intercepted in New Zealand, but is not considered to be established (T. Crosby pers. comm.).

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Sinoxylon anale	Coleoptera: Bostrychidae	Common auger beetle		1		Regulated
Sinoxylon conigerum	Coleoptera: Bostrychidae	Horned powderpost beetle		1		Regulated
Sinoxylon sp.	Coleoptera: Bostrychidae	Horned powderpost beetle	1	2		Regulated
Sitona sp.	Coleoptera: Curculionidae	Weevil		1		Genus present in NZ
Sitophilus granarius	Coleoptera: Curculionidae	Granary weevil	1			Non-regulated
Sitophilus oryzae	Coleoptera: Curculionidae	Rice weevil	1			Non-regulated
Sitophilus sp.	Coleoptera: Curculionidae	Grain weevil	1	1		Genus present in NZ
Stegobium paniceum	Coleoptera: Anobiidae	Drug store beetle		1		Non-regulated
Stenotrupis sp.	Coleoptera: Curculionidae	Weevil	1			Genus present in NZ
Sylvicola sp.	Diptera: Anisopodidae	Wood gnat	1	1		Genus present in NZ
Tabanus sp.	Diptera: Tabanidae	Horse fly		1		Genus present in NZ
Tapinoma sp.	Hymenoptera: Formicidae	Ghost ant	1			Regulated
Technomyrmex albipes	Hymenoptera: Formicidae	Whitefooted house ant	2			Non-regulated
Technomyrmex sp.	Hymenoptera: Formicidae	Ant	1			Genus present in NZ
Thysanoplusia orichalcea	Lepidoptera: Noctuidae	Soybean moth	2			Non-regulated
Tinea pellionella	Lepidoptera: Tineidae	Casemaking clothes moth		1		Non-regulated
Toxorhynchites sp.	Diptera: Culicidae	Mosquito			1	Regulated
Tribolium brevicorne	Coleoptera: Tenebrionidae	Giant flour beetle larvae	1			Regulated

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Tribolium castaneum	Coleoptera: Tenebrionidae	Rust red flour beetle	5	3	2	Non-regulated
Tribolium confusum	Coleoptera: Tenebrionidae	Confused flour beetle	2	2		Non-regulated
Tribolium sp.	Coletopera: Tenebrionidae	Flour beetle	1			Genus present in NZ
Trochoideus desjardinsi	Coleoptera: Endomychidae	Handsome fungus beetle	1			Regulated
Trogoderma granarium	Coleoptera: Dermestidae	Khapra beetle	1			Regulated
Trogoderma simplex	Coleoptera: Dermestidae	Trogoderma beetle	1			Regulated
Trogoderma versicolor	Coleoptera: Dermestidae	Larger cabinet beetle	1			Regulated
Tropideres sp.	Coleoptera: Anthribidae	Fungus weevil	1			Regulated
Typhaea stercorea	Coleoptera: Mycetophagidae	Hairy fungus beetle	1	1		Regulated
Vespula vulgaris	Hymenoptera: Vespidae	Common wasp		1		Non-regulated
Xylion sp.	Coleotpera: Bostrychidae	Horned powderpost beetle			1	Regulated
Xylothrips sp.	Coleoptera: Bostrychidae	Horned powderpost beetle		1		Regulated
Not sent for ID	Blattodea: Indet.	Cockroach	9	2	2	Order present in NZ
Not sent for ID	Coleoptera: Indet.	Beetle	3	2	1	Order present in NZ
Not sent for ID	Dermaptera: Indet.	Earwig	1			Order present in NZ
Not sent for ID	Diptera: Indet.	Fly	5		1	Order present in NZ
Not sent for ID	Diptera: Cecidomyiidae	Gall midge larva	1			Family present in NZ
Not sent for ID	Hymenoptera: Formicidae	Ant	4		1	Family present in NZ

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Not sent for ID	Lepidoptera: Indet.	Moth		2		Order present in NZ
Not sent for ID	Orthoptera: Indet.	Locust case		1		Order present in NZ
Not sent for ID	Psocoptera: Indet.	Barklouse	1		1	Order present in NZ
Not sent for ID	Psocoptera: Indet.	Booklouse	2			Order present in NZ
Not sent for ID	Indet.	Insects	24	2	5	Unknown
Isopods	**Order: Family**					
Armadillidium sp.	Isopoda: Armadillidiidae	Woodlouse	1	1		Genus present in NZ
Indet.	Isopoda: Indet.	Woodlouse		1		Order present in NZ
Ligia sp.	Isopoda: Ligiidae	Woodlouse		1		Regulated
Not sent for ID	Isopoda: Indet.	Slater		1		Order present in NZ
Millipedes	**Order: Family**					
Indet.	Indet.	Millipede		2		Order present in NZ
Ophyiulus pilosus	Julida: Julidae	Millipede		1		Regulated
Mites	**Order: Family**					
Androlaelaps casalis[52]	Mesostigmata: Laelapidae	Predatory mite	1			Present in NZ
Haemaphysalus sp.	Ixodida: Ixodidae	Tick			1	Genus present in NZ
Indet.	Indet.	Mites		1		Unknown
Indet.	Oribatida: Circumdehiscentidae	Oribatid mites	1			Regulated

[52] The subspecies *Androlaelaps casalis casalis* is listed in the MAF Plants Biosecurity Master Pest List as regulated.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Lasioseius sp.	Mesostigmata: Ascidae	Predatory mite	1			Regulated
Macrocheles musaedomesticae	Mesostigmata: Macrochelidae	Mesostigmatid mite		1		Non-regulated
Indet.	Mesostigmata: Indet	Mite eggs	1			Regulated
Not sent for ID	Indet.	Mite	1		1	Unknown
Molluscs	**Order: Family**					
Helix aspersa	Stylommatophora: Helicidae	Brown garden snail		1		Non-regulated
Indet.	Indet.	Snail	2	2		Unknown
Plant material	**Family**					
Acacia sp.	Mimosaceae	Wattle			2	Prohibited[53]
Acer sp.	Aceraceae	Maple leaf			1	Prohibited
Acer japonicum	Aceraceae	Japanese maple leaves		1		Prohibited
Agrostis avenacea	Poaceae	Grass leaf		1		Prohibited
Albizia falcataria	Mimosaceae	Silk tree leaves		1		Prohibited
Allium cepa	Lilaceae	Onion skins		1		Prohibited
Alnus sp.	Betulaceae	Alder leaf		1		Prohibited
Apium graveolens	Apiaceae	Celery leaves		1		Prohibited

[53] Although the specimens found as plant material were non-propagatable and did not pose risks as new organisms, this type of material is prohibited because of the potential to vector disease. Plant material specimens found showing disease symptoms were cultured for fungi, and the species isolated are listed in the fungi section of the table.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Areca catechu	Arecaceae	Betel nut husk			1	Prohibited
Bambusa sp.	Poaceae	Bamboo leaf		1		Prohibited
Berberis sp.	Beriberidaceae	Leaf			1	Prohibited
Callistemon sp.	Myrtaceae	Bottlebrush		1		Prohibited
Cirsium vulgare	Asteraceae	Scotch thistle			1	Prohibited
Citrus sp.	Rutaceae	Citrus fruits and peel		1	2	Prohibited
Cocos sp.	Arecaceae	Copra meal		1		Prohibited
Crategus sp.	Rosaceae	Hawthorn leaf		1		Prohibited
Eucalyptus sp.	Myrtaceae	Gum leaves		8		Prohibited
Ficus microcarpa	Moraceae	Indian laurel fig leaves		1		Prohibited
Ficus platypoda	Moraceae	Fig leaves		1		Prohibited
Ficus rubiginosa	Moraceae	Botany bay fig leaves		1		Prohibited
Ficus sp.	Moraceae	Leaf		1		Prohibited
Ginkgo biloba	Ginkgoaceae	Maidenhair leaf		1	1	Prohibited
Gossypium arboreum	Malvaceae	Cotton capsules		1		Prohibited
Hedera sp.	Araliaceae	Ivy leaf			1	Prohibited
Indet.	Poaceae	Bamboo branch			2	Prohibited
Indet.	Unknown	Bark		2		Prohibited

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Indet.	Asteraceae	Calyx limb		1		Prohibited
Indet.	Pinaceae	Conifer bark		2		Prohibited
Indet.	Poaceae	Grass leaf		1		Prohibited
Indet.	Unknown	Leaves		9	5	Prohibited
Indet.	Unknown	Plant filaments			1	Prohibited
Indet.	Unknown	Flowers and leaf		1		Prohibited
Indet.	Unknown	Inflorescences		1		Prohibited
Indet.	Fabaceae	Legume seedless capsule		1		Prohibited
Indet.	Unknown	None		1		Prohibited
Magnolia sp.	Magnoliaceae	Magnolia		2		Prohibited
Mangifera indica	Anacardiaceae	Mango leaves			1	Prohibited
Metrosideros kermadecensis	Myrtaceae	Kermadec pohutukawa leaf			1	Prohibited
Misc plant material- pappus and chaff	Unknown	Unknown		1	15	Prohibited
Miscanthus sinensis	Poaceae	Eulalia		1		Prohibited
Miscanthus sp.	Poaceae	Fairy grass		1		Prohibited
Morus sp.	Moraceae	Mulberry flowers		1		Prohibited
Oryza sativa	Lilaceae	Rice			2	Prohibited
Phleum pratense	Poaceae	Timothy grass		1		Prohibited

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Pinus sp.	Pinaceae	Pine needles		1	2	Prohibited
Populus sp.	Salicaceae	Poplar leaves			1	Prohibited
Prunus sp.	Rosaceae	Flowering cherry leaves		1		Prohibited
Pyracantha sp.	Rosaceae	Firethorn leaf		1		Prohibited
Quercus sp.	Fagaceae	Oak leaf			2	Prohibited
Rubus sp.	Rosaceae	Blackberry shoot		1	1	Prohibited
Salix sp.	Salicaceae	Willow leaf fragments		1		Prohibited
Syzygium malaccense	Myrtaceae	Rose apple leaf		1		Prohibited
Syzygium sp.	Myrtaceae	Leaf		1		Prohibited
Not sent for ID	Rosaceae	Apple core			1	Prohibited
Not sent for ID	Vitaceae	Grapes			1	Prohibited
Not sent for ID	Lilaceae	Onion skins			2	Prohibited
Not sent for ID	Poaceae	Rice			39	Prohibited
Not sent for ID	Unknown	Miscellaneous plant material			49	Prohibited
Ulmus sp.	Ulmaceae	Elm leaves			1	Prohibited
Reptiles	**Order: Family**					
Hemidactylus bowringii	Squamata: Gekkonidae	Gecko	1			Regulated
Indet.	Squamata: Scincidae	Skink		1		Family present in NZ

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Not sent for ID	Squamata: Gekkonidae	Gecko		2		Family present in NZ
Seeds						
Acacia sp.[B]	Mimosaceae	Wattle			1	Genus present in NZ
Agrostis capillaris[P]	Poaceae	Browntop			1	Present in NZ
Albizia sp.[B]	Mimosaceae	Silk tree			1	Present in NZ
Andropogon sp.[P]	Poaceae	Grass			1	Genus present in NZ
Arachis hypogoea[B]	Fabaceae	Peanuts			2	Present in NZ
Argemone ochroleuca[B]	Papaveraceae	Prickly poppy			1	Present in NZ
Asclepias sp.[B]	Asclepiadaceae	Milkweed genus			1	Genus present in NZ
Aster subulatus[B]	Asteraceae	Bushy starwort			3	Present in NZ
Avena fatua[U]	Poaceae	Wild oats			3	Present in NZ
Betula sp.[B]	Betulaceae	Birch			2	Present in NZ
Brassica sp.[B]	Brassicaceae	Cabbage genus			1	Present in NZ
Brassica tournefortii[B]	Brassicaceae	Wild turnip			1	Present in NZ
Carthamus tinctorius[P]	Asteraceae	Safflower			1	Present in NZ
Chloris gayana[P]	Poaceae	Rhodes grass			2	Present in NZ

[B] Indicates Basic entry conditions required for seed import (botanical name and inspection of a sample)
[P] Indicates a phytosanitary certificate is required for seed import
[U] This is a one of the world's 10 worst weeds (Holm 1977) and, although present, is unwanted in New Zealand

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Chloris truncata [P]	Poaceae	Windmill grass			1	Present in NZ
Cicer arietinum [P]	Fabaceae	Chickpea			5	Present in NZ
Cirsium sp. [B]	Asteraceae	Thistle			1	Genus present in NZ
Cirsium vulgare [B]	Asteraceae	Scotch thistle			2	Present in NZ
Coffea arabica [P]	Rubiaceae	Coffee			2	Present in NZ
Conyza canadensis [B]	Asteraceae	Canadian fleabane			6	Present in NZ
Cucumis sativus [B]	Cucurbitaceae	Cucumber			1	Present in NZ
Cuminum cyminum [P]	Apiaceae	Cumin			1	Present in NZ
Deyeuxia forsteri [B]	Poaceae	Unknown			1	Present in NZ
Eleusine indica [B]	Poaceae	Crowsfoot grass			1	Present in NZ
Epilobium sp. [B]	Onagraceae	Willow herb			1	Genus present in NZ
Eriochloa sp.[R]	Poaceae	Spring grass			1	Regulated
Eriochloa procera [R]	Poaceae	Spring grass			1	Regulated
Fagopyrum esculentum [B]	Polygonaceae	Buckwheat			2	Present in NZ
Gossypium sp. [P]	Malvaceae	Cotton			1	Genus present in NZ

[R] As this species is not known to occur in New Zealand, it is regulated as a new organism under HSNO
[R] As this species is not known to occur in New Zealand, it is regulated as a new organism under HSNO
[B] Indicates Basic entry conditions required for seed import (botanical name and inspection of a sample)
[P] Indicates a phytosanitary certificate is required for seed import

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Guizotia abyssinica [B]	Asteraceae	Niger seed			1	Present in NZ
Helianthus annuus [P]	Asteraceae	Sunflower			1	Present in NZ
Hirschfeldia incana [B]	Brassicaceae	Bastard rocket			1	Present in NZ
Hordeum murinum [P]	Poaceae	Barley grass			2	Present in NZ
Hordeum sp. [P]	Poaceae	Barley grass			2	Genus present in NZ
Hordeum vulgare [P]	Poaceae	Barley			3	Present in NZ
Hypochoeris glabra [B]	Asteraceae	Smooth catsear			1	Present in NZ
Hypochoeris radicata [B]	Asteraceae	Catsear			5	Present in NZ
immature, empty seed	Asteraceae	Thistle			1	Unknown
Imperata cylindrica [B]	Poaceae	Blady grass			2	Present in NZ
Indet.	Unknown	Unknown seed			3	Unknown
Lablab nigra [P]	Fabaceae	Hyacinth bean			1	Present in NZ
Lachnagrostis filiformis [P]	Poaceae	Wind grass			1	Present in NZ
Lactuca sativa [B]	Asteraceae	Lettuce			2	Present in NZ
Lens culinaris [B]	Fabaceae	Lentils			9	Present in NZ
Leontodon autumnalis [B]	Asteraceae	Autumn hakbit			1	Present in NZ
Medicago polymorpha [P]	Fabaceae	Bur medic			1	Present in NZ
Panicum miliaceum [P]	Poaceae	Millet			2	Present in NZ

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Phalaris canariensis [P]	Poaceae	Canary grass			1	Present in NZ
Phaseolus mungo [P]	Fabaceae	Mung bean			1	Present in NZ
Phaseolus radiatus [P]	Fabaceae	Mung bean			4	Present in NZ
Phaseolus sp. [P]	Fabaceae	Beans			1	Genus present in NZ
Phaseolus vulgaris [P]	Fabaceae	Red kidney bean			2	Present in NZ
Phragmites communis [W]	Poaceae	Reed			1	Present in NZ
Picris echioides [B]	Asteraceae	Ox-tongue			3	Present in NZ
Pisum sativum [P]	Fabaceae	Peas			1	Present in NZ
Prunus sp. [P]	Rosaceae	Stonefruit			2	Genus present in NZ
Rhynchelytrum repens [B]	Poaceae	Red natal grass			1	Present in NZ
Saccharum spontaneum [R]	Poaceae	Wild sugarcane			2	Regulated
Senecio vulgaris [B]	Asteraceae	Groundsel			2	Present in NZ
Setaria sp. [P]	Poaceae	Bristlegrass			1	Genus present in NZ
Sonchus arvensis [B]	Asteraceae	Prickly sow thistle			2	Present in NZ
Sonchus oleraceus [B]	Asteraceae	Sow thistle			2	Present in NZ
Sorghum bicolor [P]	Poaceae	Grain sorghum			1	Present in NZ

[W] This is a synonym of *Phragmites australis*, a species listed on the National Pest Plant Accord, http://www.protectnz.org.nz, and prohibited from sale, propagation and distribution within New Zealand.
[R] As this species is not known to occur in New Zealand, it is regulated as a new organism under HSNO

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Sorghum sp. [B]	Poaceae	Sorghum grain			1	Genus present in NZ
Tamus communis [B]	Dioscordaceae	Black bryony			1	Present in NZ
Taraxacum officinale [B]	Asteraceae	Dandelion			4	Present in NZ
Triticum aestivum [P]	Poaceae	Wheat			1	Present in NZ
Typha angustifolia [B]	Typhaceae	Narrowleaf catstail			6	Present in NZ
Unidentified	Asteraceae	Thistle flower			1	Family present in NZ
Unidentified	Unknown	Tree seed			1	Unknown
Zea mays [P]	Poaceae	Maize/corn			1	Present in NZ
Not sent for ID	Fagaceae	Acorn			1	Family present in NZ
Not sent for ID	Rosaceae	Almonds			1	Present in NZ[54]
Not sent for ID	Poaceae	Barley			4	Present in NZ
Not sent for ID	Fabaceae	Beans			5	Present in NZ
Not sent for ID	Fabaceae	Chickpea			2	Present in NZ
Not sent for ID	Unknown	poss. Cocoa beans			1	Unknown
Not sent for ID	Rubiaceae	Coffee beans			54	Present in NZ

[B] Indicates Basic entry conditions required for seed import (botanical name and inspection of a sample)
[P] Indicates a phytosanitary certificate is required for seed import
[54] Seeds of common food crops that were not formally identified have been listed as “present in New Zealand” – in some cases, they may have been residues of previous seed cargoes (for growing), and in other cases, residues of stored product cargoes (for consumption). Importation of these, or other, species for propagation may require phytosanitary certification to ensure freedom from disease.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Not sent for ID	Malvaceae	Cotton			9	Present in NZ
Not sent for ID	Asteraceae	Dandelion			20	Family present in NZ
Not sent for ID	Ulmaceae	Elm			1	Family present in NZ
Not sent for ID	Poaceae	Grass			1	Family present in NZ
Not sent for ID	Fabaceae	Lentils			6	Present in NZ
Not sent for ID	Poaceae	Maize/corn			6	Present in NZ
Not sent for ID	Poaceae	Millet			1	Present in NZ
Not sent for ID	Poaceae	Oats			2	Present in NZ
Not sent for ID	Fabaceae	Peanuts			1	Present in NZ
Not sent for ID	Fabaceae	Peas			4	Present in NZ
Not sent for ID	Cucurbitaceae	Pumpkin seeds			1	Present in NZ
Not sent for ID	Pedaliaceae	Sesame seed			1	Present in NZ
Not sent for ID	Asteraceae	Sunflower seed			3	Present in NZ
Not sent for ID	Asteraceae	Thistle			2	Family present in NZ
Not sent for ID	Unknown	Unknown grain			7	Unknown
Not sent for ID	Unknown	Unknown seeds			32	Unknown
Not sent for ID	Poaceae	Wheat			35	Present in NZ
Spiders	**Order: Family**					

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Achaearanea sp.	Araneae: Theridiidae	Combfooted spider	26	3	5	Genus present in NZ
Achaearanea tepidariorum	Araneae: Theridiidae	House spider	5			Non-regulated
Agassa sp.	Araneae: Salticidae	Jumping spider			1	Regulated
Agelenopsis sp.	Araneae: Agelenidae	Funnel web spider	1			Regulated
Anelosimus sp.	Araneae: Thridiidae	Combfooted spider	1			Regulated
Araneus sp. [55]	Araneae: Araneidae	Orbweb spider	7	1		Regulated
Badumna robusta[56]	Araneae: Desidae	Black house spider	1			Non-regulated
Cheiracanthium sp.	Araneae: Clubionidae	Hunting spider	1			Genus present in NZ
Conopistha sp.	Araneae: Theridiidae	Combfooted spider	1			Regulated
Coriarachne sp.	Araneae: Thomisidae	Crab spider	1			Regulated
Crustulina sp.	Araneae: Theridiidae	Combfooted spider	1			Regulated
Delena cancerides	Araneae: Heteropodidae	Avondale spider		1		Non-regulated
Dictyna sp.[57]	Araneae: Dictynidae	Cribellate spider	1			Regulated
Dolomedes minor	Araneae: Pisauridae	Nursery web spider	1			Non-regulated

[55] The World Spider Catalog, http://research.amnh.org/entomology/spiders/catalog81-87/ARANEIDAE.html, lists 5 members of the genus *Araneus* as being present in New Zealand. Of these species, four are not listed as present anywhere else in the world: a fifth, *Araneus brisbane*, is also present in Australia. However, the New Zealand species may have been recently reclassified: Sirvid (in press) does not list any members of *Araneus* as present in New Zealand.
[56] The World Spider Catalog, http://research.amnh.org/entomology/spiders/catalog81-87/DESIDAE.html, lists *Badumna robusta* as a synonym of *B. insignis*, which is listed as present in New Zealand by Sirvid (in press).
[57] The World Spider Catalog, http://research.amnh.org/entomology/spiders/catalog81-87/DICTYNIDAE.html, lists one member of the genus *Dictyna*, *D. urquharti*, as being present in New Zealand; this species is not present elsewhere in the world. Platnick (2002) also lists this species as present in New Zealand, but Forster and Forster (1999) do not include *Dictyna* in their list of Dictynidae present in New Zealand.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Dolomedes sp.	Araneae: Pisauridae	Nursery web spider		1		Genus present in NZ
Drapetisca sp.[58]	Araneae: Linyphiidae	Line weaving spider		1		Regulated
Drassodes gosiutus	Araneae: Gnaphosidae	Gnaphosid spider	1			Regulated
Enoplognatha sp.	Araneae: Theridiidae	Combfooted spider	1			Regulated
Euophrys sp.	Araneae: Salticidae	Jumping spider	1			Genus present in NZ
Frontinella sp.	Araneae: Linyphiidae	Line weaving spider	1	1		Regulated
Gnaphosa sp.	Araneae: Gnaphosidae	Stealth spider	1			Regulated
Habrocestum sp.	Araneae: Salticidae	Jumping spider		1		Regulated
Habronathus sp.	Araneae: Salticidae	Jumping spider	1			Regulated
Hemicloea sp.	Araneae: Gnaphosidae	Sac spider	1			Genus present in NZ
Indet.	Araneae: indet	Spider	1	5	4	Order present in NZ
Indet.	Araneae: indet	Spider eggs		3		Order present in NZ
Indet.	Araneae: Agelenidae	Funnel web weaver	1			Family present in NZ
Indet.	Araneae: Araneidae	Orbweb spider	1			Family present in NZ
Indet.	Araneae: Clubionidae	Hopping spider	2			Family present in NZ
Indet.	Araneae: Clubionidae	Hunting spider		1		Family present in NZ

[58] One member of this genus, *Drapetisca australis*, occurs in the Antipodes Islands (http://research.amnh.org/entomology/spiders/catalog81-87/LINYPHIIDAE.html). However, no members of this genus are listed as occurring in the main islands of New Zealand.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Indet.	Araneae: Gnaphosidae	Sac spider	1			Family present in NZ
Indet.	Araneae: Gnaphosidae	Stealth spider		1		Family present in NZ
Indet.	Araneae: Idiopidae	Trapdoor spider		1		Family present in NZ
Indet.	Araneae: Linyphiidae	Line weaving spider	5	2		Family present in NZ
Indet.	Araneae: Pholcidae	Daddy long legs spider	10	2	1	Family present in NZ
Indet.	Araneae: Salticidae	Jumping spider	4	2		Family present in NZ
Indet.	Araneae: Theridiidae	Combfooted spider	11	4	2	Family present in NZ
Indet.	Araneae: Thomisidae	Crab spider	1			Family present in NZ
Lampona cylindrata	Araneae: Lamponidae	Whitetailed spider			1	Non-regulated
Latrodectus hasselti[59]	Araneae: Theridiidae	Redback spider	3	2		Regulated
Leucauge sp.	Araneae: Araneidae	Orbweb spider	2			Genus present in NZ
Metepeira sp.	Araneae: Araneidae	Orbweb spider	4			Regulated
Mimetus sp.	Araneae: Mimetidae	Pirate spider	1			Genus present in NZ
Nicodamus sp.	Araneae: Theridiidae	Combfooted spider	1			Regulated
Notiodrassus distinctus	Araneae: Gnaphosidae	Stealth spider	1			Non-regulated
Oecobius sp.	Araneae: Oecobiidae	Weaver spider	3			Genus present in NZ
Olios sp.	Araneae: Sparassidae	Badge spider	1			Regulated

[59] Although this species is present in New Zealand, of limited distribution but not under official control, it is regulated by the Ministry of Health.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Ostearius melanopygius	Araneae: Linyphiidae	Line weaving spider	1			Non-regulated
Oxyopes sp.	Araneae: Oxyopidae	Lynx spider	2			Genus present in NZ
Pholcus phalangioides	Araneae: Pholcidae	Daddy long legs spider	5	2	2	Non-regulated
Pholcus sp.	Araneae: Pholcidae	Daddy long legs spider	40	3	9	Genus present in NZ
Phoroncidia sextuberculata	Araneae: Theridiidae	Combfooted spider	1			Regulated
Physocyclus californicus	Araneae: Pholcidae	Daddy long legs	1			Regulated
Physocyclus sp.	Araneae: Pholcidae	Daddy long legs spider	3	1	1	Regulated
Plexippus sp.	Araneae: Salticidae	Jumping spider	2			Regulated
Psilochorus sp.	Araneae: Pholcidae	Daddy long legs spider	21			Regulated
Scytodes thoracica[60]	Araneae: Scytodidae	European spitting spider	1			Non-regulated
Spermophora sp.	Araneae: Pholcidae	Cellar spider	1			Regulated
Steatoda grossa	Araneae: Theridiidae	Combfooted spider		1		Non-regulated
Steatoda sp.	Araneae: Theridiidae	Combfooted spider	6			Genus present in NZ
Tekelloides sp.	Araneae: Cyatholipidae	Cyatholipid spider			1	Genus present in NZ
Theridion sp.	Araneae: Theridiidae	Combfooted spider	17	2	5	Regulated[61]

[60] Sirvid (in press) lists this species as recorded from New Zealand but not established.
[61] The genus *Theridion* is listed in the MAF Plants Biosecurity Master Pest List as regulated by MAF Animals Biosecurity. According to the World Spider Catalogue, http://research.amnh.org/entomology/spiders/catalog81-87/THERIDIIDAE.html, 13 species of the world-wide genus *Theridion* occur in New Zealand. None of these species occur elsewhere in the world. Classification of Theridiidae in New Zealand appears somewhat controversial: Forster and Forster (1999) list no native representatives of *Theridion*, while Sirvid (in press) does. In any case, the New Zealand species originally placed in the genus *Theridion* are confined to New Zealand, so that species of this genus intercepted in sea containers from overseas are likely to be exotic, and hence, regulated.

Scientific Name	Taxonomy[27]	Common Name	No. containers with specimens			Status[28]
			Alive/Viable	Dead	Unknown/NA	
Not sent for ID	Araneae: Pholcidae	Daddy long legs	11	4	15	Unknown
Not sent for ID	Araneae: indet	Unknown spider	15	7	5	Unknown
Not sent for ID	Opiliones: indet	Harvestman spider	1			Unknown

Appendix 2. Container Devanning, Storage & Packing Sites

Figure 9. Devanning sites of containers imported through Auckland

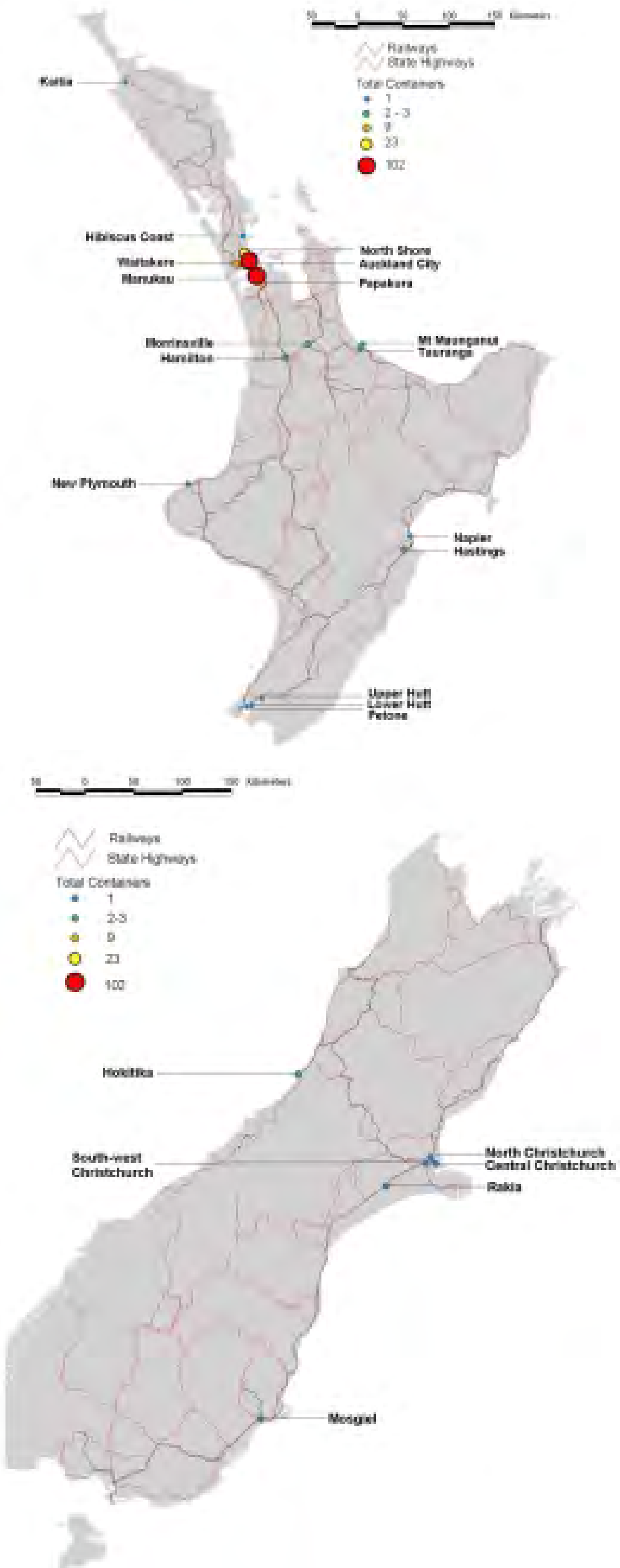


Figure 10. Devanning sites of containers imported through Tauranga

Figure 11. Devanning sites of containers imported through Napier

Figure 12. Devanning sites of containers imported through Lyttelton

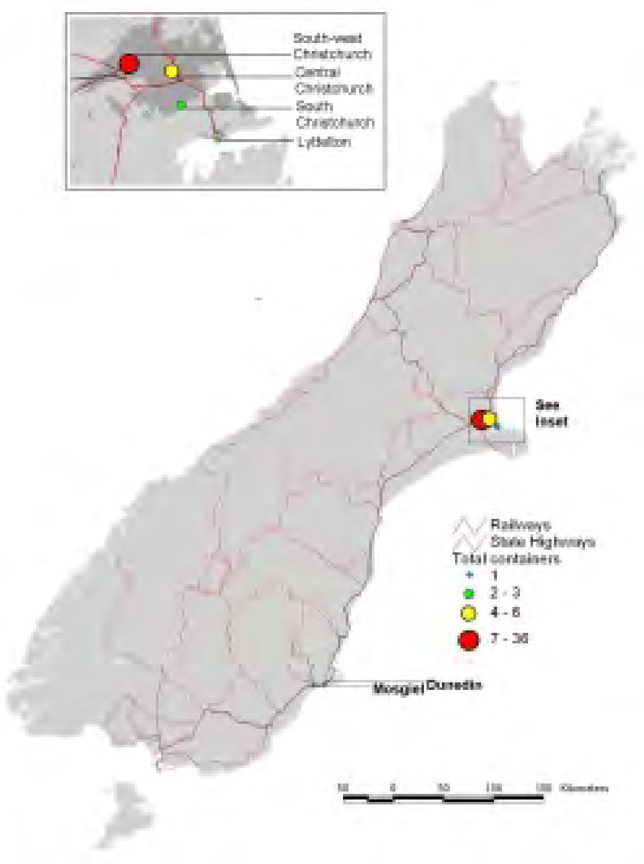


Figure 13. Storage sites of containers imported through Auckland

Figure 14. Storage sites of containers imported through Tauranga

Figure 15. Storage sites of containers imported through Napier

Figure 16. Storage sites of containers imported through Lyttelton

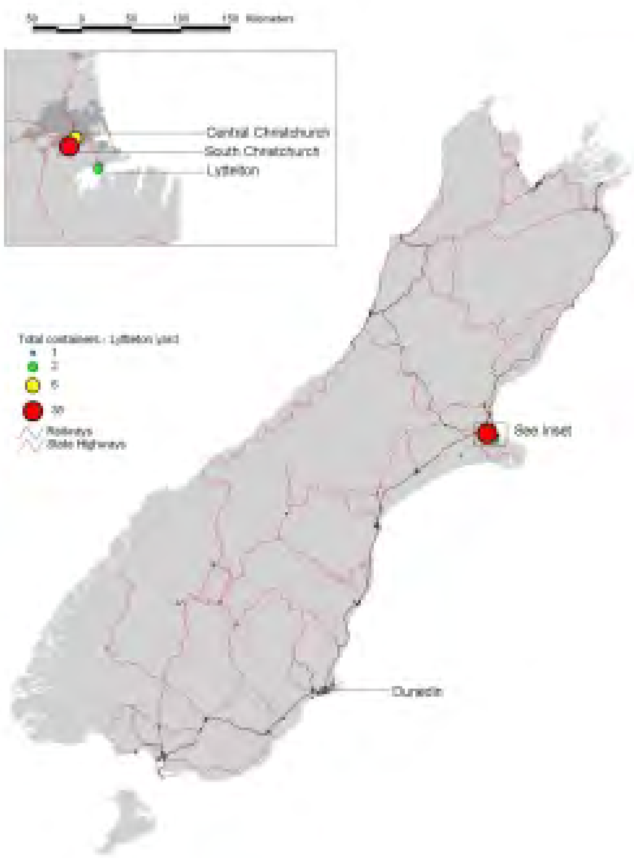


Figure 17. Packing sites of containers imported through Auckland

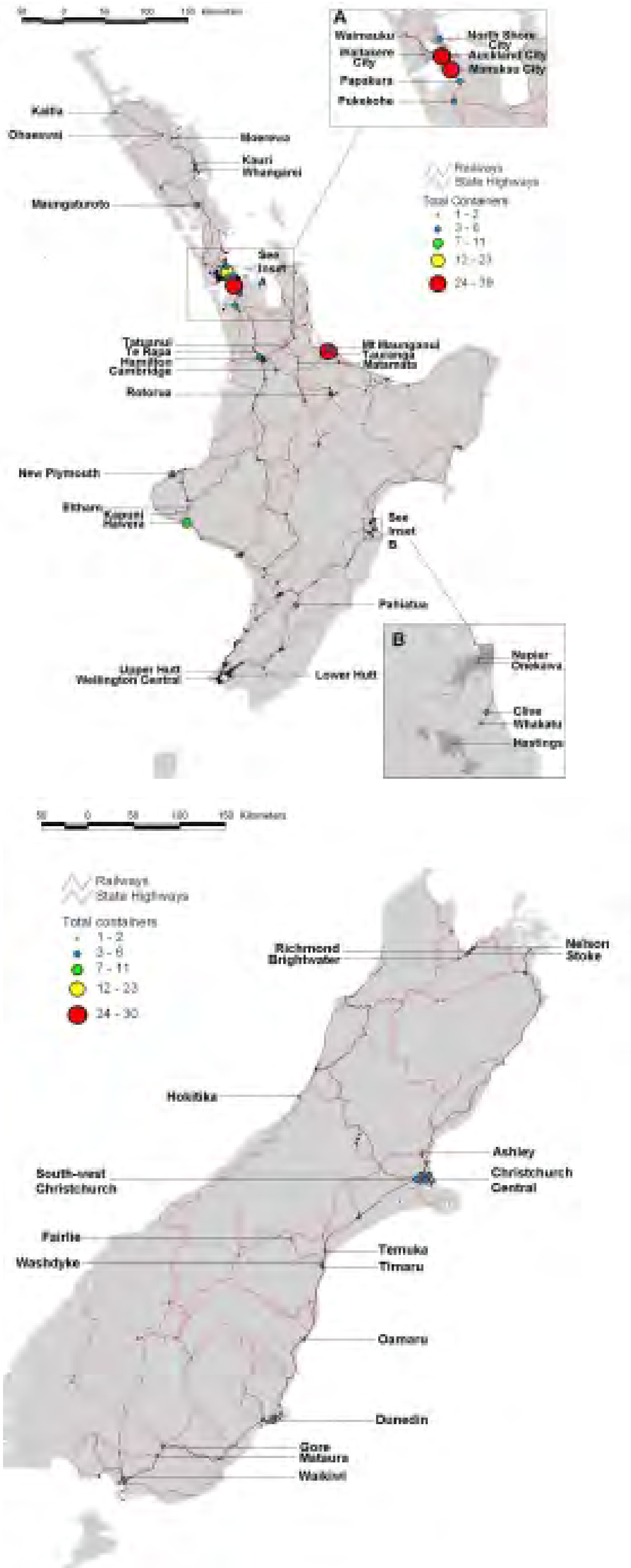


Figure 18. Packing sites of containers imported through Tauranga

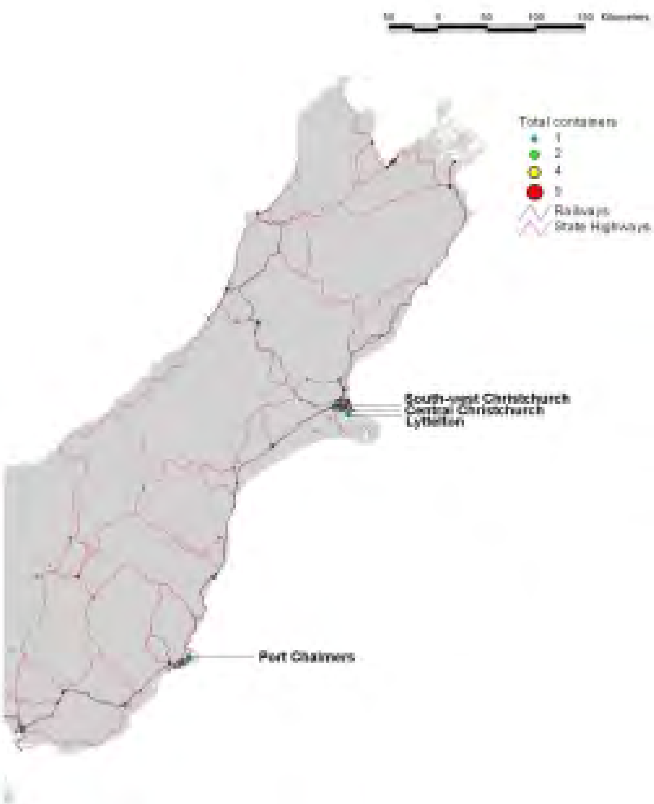
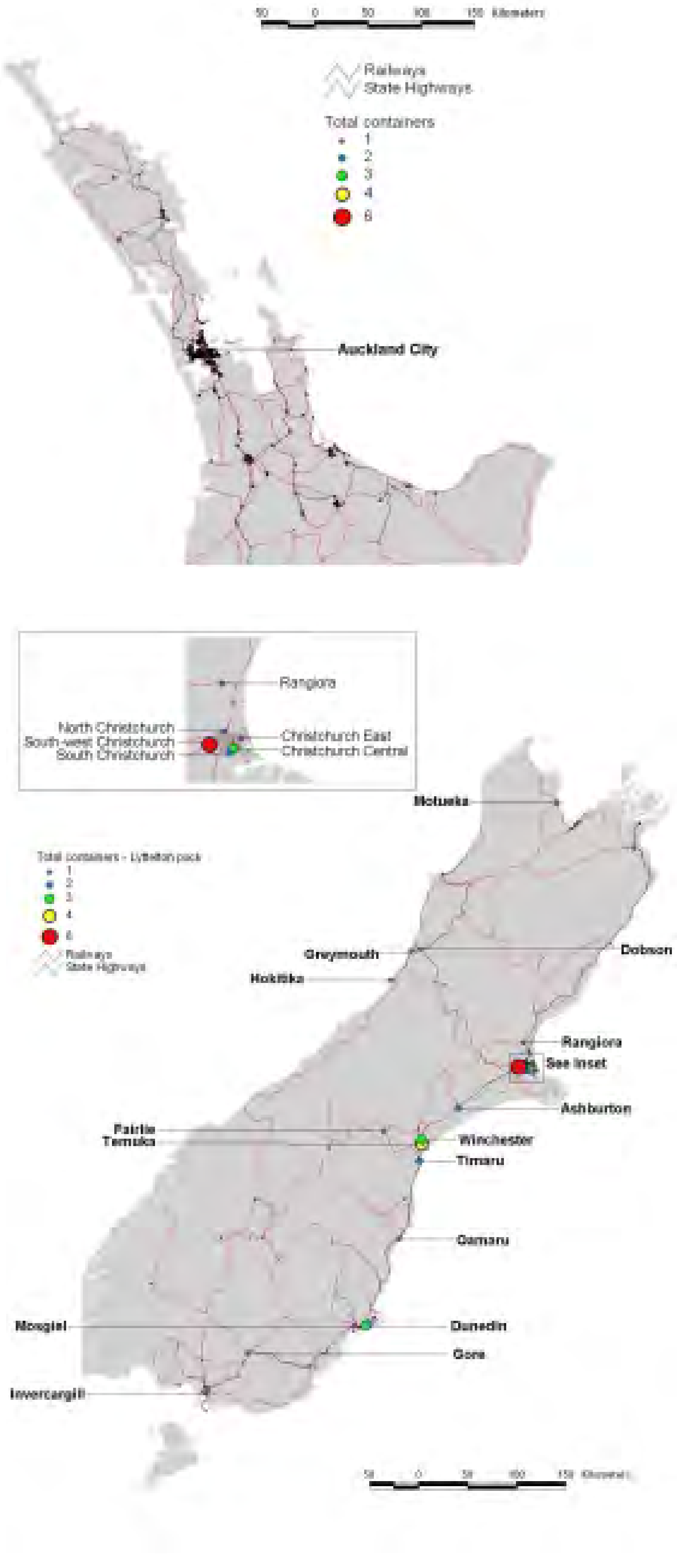


Figure 19. Packing sites of containers imported through Napier

Figure 20. Export packing sites of containers imported through Lyttelton



Appendix 3. Synopsis of New Technology Research

As part of this container review, several research projects investigating new technology for mitigating container risks were undertaken. A brief summary of research findings is set out below.

Evaluation of Methods for Fumigating Thermo-conforming Vertebrates

Traditionally, methyl bromide has been the fumigant of choice in New Zealand when fumigating containers or cargo because of the potential presence of reptiles, particularly snakes. Results have generally been adequate; however, being cold-blooded, the metabolism of some reptiles can be slowed to such an extent that the uptake of the fumigant is not sufficient to kill.

Crop and Food Research Ltd investigated whether current MAF procedures were sufficient for successful reptile fumigation.

The report concluded that the current methyl bromide rate used by MAF (80g per cubic metre/4 hrs) is effective for killing reptiles, with even lower rates giving 100 percent (18/18) kills of tested snakes (Savarie & Bruggers 1999). The report also gave options for two other fumigants, sulphuryl fluoride and phosphine, and a heat treatment rate known to be effective against reptiles.

Detection of Snakes and Spiders Using Electronic Sniffer Technology

Given the logistic difficulty of inspecting every container and item of cargo for spiders and snakes, the possibility of using electronic sniffer technology to detect the presence of these organisms was investigated.

Such technology is used, for example, to detect illegal immigrants in shipping containers in Europe and Hong Kong by detecting raised carbon dioxide levels within the container. If spiders or snakes released a unique chemical signature that could be detected electronically, it could result in more efficient and effective detection of such species than with present methods.

The research was undertaken by AgResearch Ltd. The project evaluated 18 species of snakes and more than 34 species of spiders for emission of volatile compounds sufficient to enable detection by an electronic sniffer. A commercially available sniffer was tested on four snake species and one spider species.

The results of the project were not encouraging. The snakes and spiders tested emitted insufficient odours for reliable detection within the containers. Furthermore, the “fingerprint” volatiles emitted tended to be species-specific, whereas the volatiles emitted in common (e.g. acetic acid, phenol) are also released by many inanimate products (e.g. paints, plastics, glues and wood) that are often transported within shipping containers. However, this technology is in its infancy; it is possible that future work in this area will be warranted as these technologies are refined. It is possible that the method would be more successful in detecting social insects such as ants or termites, if present in sufficient numbers.

Automatic Container Washing Machine

Eggs of the moth family Lymantriidae, which includes painted apple moth, gypsy moth and white spotted tussock moth, are laid in rafts that adhere to the surfaces on which they are laid. Eggs are laid without regard to substrate, and egg rafts of lymantriids have been found on sea containers arriving in New Zealand (Gadgil et al 1999). HortResearch Ltd assessed the feasibility of using an automated container wash system to decontaminate the external surface of containers within a short period of time.

A basic prototype machine was built and trialed by Container Wash Systems Ltd. The machine was capable of removing sterile eggs masses of painted apple moth (a lymantriid species) and other external contaminants from sea containers. Drawbacks identified with the machine were high costs: a high through-put would be required in order to make the process economically feasible. In addition, the wash process could only be used on containers that are structurally sound and leak proof.

Heat Treatment of Containers

In general, arthropods such as insects and spiders rapidly succumb to temperatures in excess of 50 degrees Celsius (Hosking 2002). In order to evaluate the practicality of using heat instead of fumigation for the control of arthropods, a project was commissioned to test whether it was feasible to raise the temperature of loaded containers sufficiently to kill arthropods inside.

Research by Frontline Biosecurity Ltd demonstrated that the internal temperature of wooden pallets within the sea container could be raised to 60 degrees Celsius in 45 minutes. Two beetle species, *Hylastes ater* and *Prionoplus reticularis*, were successfully killed using the treatment, but mosquito larvae in water were not.

Bricks and tyres were used as mock cargo in the heat treatment trials, and to test the suitability of heat for treating used tyres contaminated with water and mosquito larvae.

While the method has not been fully developed, it is likely that the cost of the equipment, labour and energy could make this a more expensive option than fumigation with methyl bromide. In addition, only a limited number of commodities could withstand the heat required for arthropod treatment. Nevertheless, heat treatment may be developed as a commercially viable alternative to fumigation in the future and it may be quicker than fumigation.

Ministry of Agriculture and Forestry
Te Manatu Ahuwhenua, Ngaherehere

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Submission number:

Date received:

Submission Form

Sea Container Review Discussion Document

This form provides a basic format for a submission. Submissions in other formats are also welcome, as are any additional or general comments. Please note that submissions may be the subject of requests for information made under the Official Information Act 1982 (OIA). The OIA specifies that information is to be made available unless there are grounds for withholding it. Such grounds are set out in the OIA. Submitters may wish to indicate grounds for withholding specific information contained in their submission, such as that the information is commercially sensitive or they wish personal information (e.g. name and contact details) to be withheld. MAF will take such indications into account when determining whether or not to release information. Any decision to withhold information requested under the OIA may be reviewed by the Ombudsman**. A revised import health standard is being consulted on separately.**

Submission

Name: ____________________

Organisation/Company: ____________________

Address: ____________________

Phone: ____________________

Fax: ____________________

E-mail: ____________________

Mitigation of risks associated with sea container pathway

1. Are there any other ways, apart from those identified in the discussion document, that you consider could be applied to the sea container pathway to reduce associated biosecurity risks? How would your suggested measure(s) work in practice (and where: overseas, at the border, within New Zealand)?

2. Do you consider that non-MAF persons should be able to carry out checks on containers, subject to suitable training and audits? Why or why not?

Controls over movement of containers within New Zealand

3. What formal controls, if any, do you consider should be placed on the movement of uncleared containers within New Zealand?

Pest surveillance and controls on the locations where containers are stored

4. Should there be any pest surveillance at locations where unpacked containers are stored? Why or why not?

Responsibility for costs associated with proposed mitigation measures

5. What costs should be borne by industry? What costs should be borne by Government?

Compliance with risk mitigation strategy

6. How should compliance with the proposed risk mitigation strategy be enforced?

Please continue OTHER COMMENTS on a separate page if necessary

You might like to comment further on the issues raised above, or on whether the discussion document meets the objectives of the review (to determine the incidence of risk material associated with containers, the effectiveness of current measures used to mitigate risks, and what alternative or additional measures could be put in place to mitigate sea container risks).

Please send your submission before Monday 28 April 2003 to:

Ms Jeanette Dawson
Ministry of Agriculture and Forestry
PO Box 106231
AUCKLAND

Tel: (09) 368 5142