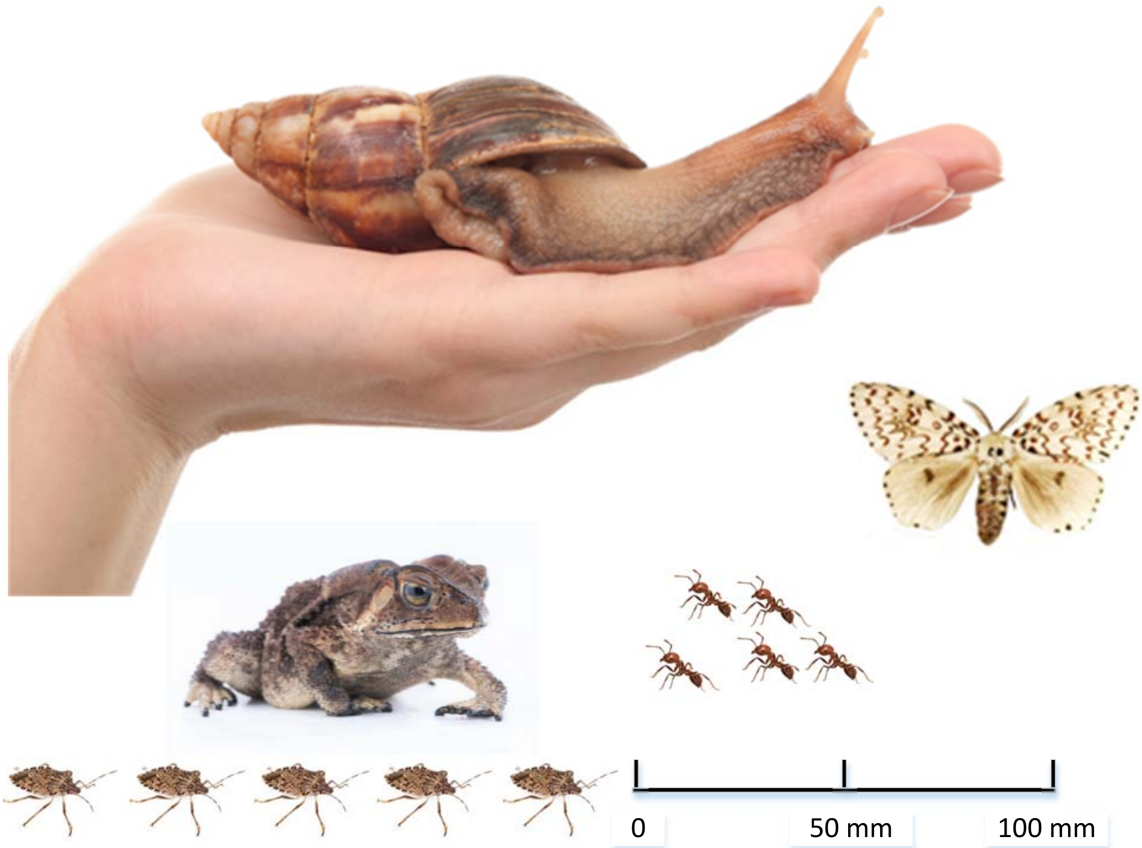
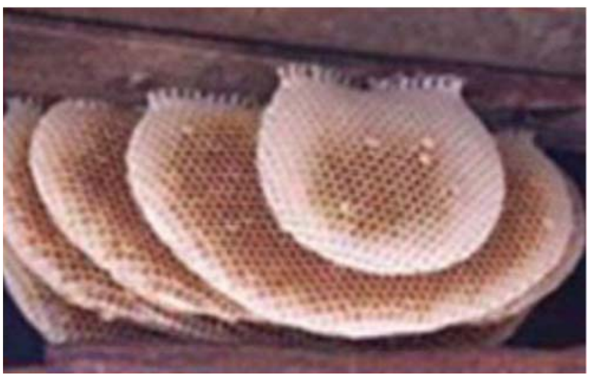
Australian Government
Inspector-General of Biosecurity

Hitchhiker pest and contaminant biosecurity risk management in Australia

Review report No. 2017–18/02





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Purpose

The purpose of this review was to examine the effectiveness of Department of Agriculture and Water Resources' management of biosecurity risks associated with hitchhiker pests and contaminants that enter Australia on sea and air conveyances, cargo containers and break-bulk cargo.

Scope

The review assessed:

- major hitchhiker pest and contamination risks to Australia
- the adequacy of departmental processes to manage current risks and identify and respond to emerging risks associated with:
  - arriving sea vessels (commercial and non-commercial)
  - sea containers (excluding cargo carried)
  - general or break-bulk cargo and bulk cargo ship holds
  - arriving aircraft and air cargo containers.

Out of scope

The review did not assess the management of hitchhiker and contaminant biosecurity risks associated with:

- arriving military vessels, aircraft, cargo or personnel—reviewed separately in 2018 (Inspector-General of Biosecurity 2018)
- invasive vector mosquitoes—reviewed in 2017 (Inspector-General of Biosecurity 2017)
- timber packaging—reviewed in 2014 (Interim Inspector-General of Biosecurity 2014)
- imported goods subject to biosecurity risk management—managed by import conditions for the relevant goods
- passengers, passenger luggage and international mail—handled significantly differently due to markedly different risks.

Potential risks

Potential risks considered included:

- the department using inadequate or incorrect risk-based and sampling methodologies (to detect, identify, control and eradicate pests)
- stakeholders not providing the department with appropriate or timely information for it to carry out its responsibilities
- stakeholders (including state and territory agencies) not receiving appropriate or timely information from the department for them to carry out their responsibilities
- inadequate capacity and capability of the department to identify new or emerging hitchhiker and contaminant entry pathways or conveyances and consider associated risks
- stakeholders having inadequate hitchhiker and contaminant pathway management obligations or not meeting obligations
- insufficient availability of departmental resources or capabilities to address relevant biosecurity risks.

Methodology

The IGB:

- reviewed relevant scientific literature, reports and departmental policies and procedures
- conducted fieldwork at airports and sea ports to view operations first hand
- visited regional offices in Brisbane, Cairns, Darwin, Melbourne, Newcastle, Port Kembla, Perth and Sydney for discussions with department staff at all levels
- held discussions with key stakeholders on how industry bodies interact with the department to apply hitchhiker and contaminant management measures through the supply chain (including offshore) at first points of entry and thereafter
- visited New Zealand to observe how the New Zealand Government Ministry for Primary Industries works with industry and the community to manage hitchhiker and contaminant biosecurity risks.

Review team

Glenn McMellon, Guy Coleman, Jonathan Muller and Dr Naveen Bhatia assisted the IGB in this review.

Summary

1 Challenges for Australia

Australia has strong controls to prevent the entry and establishment of pests and diseases that could threaten our economy, our environment or human health. High-risk goods are subject to strict biosecurity import controls. However, pests and pathogens may also travel:

- opportunistically on ships and aircraft or on the outsides and insides of sea and air containers (regardless of the goods being imported), and
- on general, non-containerised (break-bulk) cargo such as cars, tyres or machinery (which would not otherwise pose any biosecurity risk).

Pests, including pathogens, may travel alone as hitchhikers or be carried in biosecurity risk material such as soil, seeds or timber. This material can contaminate vessels or cargo.

Key hitchhiker pests targeted internationally and in Australia include:

- **giant African snails**, which feed voraciously on over 500 species of plants, including vegetables, fruits, ornamentals and eucalypts
- **exotic invasive ants**, such as red imported fire ants, which are subject to a $411.4 million national eradication program from 2017 to 2026
- **exotic bees** (such as the Africanised honey bee) and **bee pests** (such as the Varroa mite), which could imperil Australia's honey bee populations and crop pollination.

Seasonal pests subject to targeted surveillance and control measures in Australia include:

- **brown marmorated stink bugs**, which are a major horticultural, environmental and household pest
- **Asian gypsy moths**, which are a destructive pest that attacks over 650 species of trees
- **burnt pine longicorn beetles**, which attack burnt or harvested pine timber and threaten the forestry and construction industries.

Other hitchhikers, managed through ongoing specific and/or general programs, include:

- **invasive vector mosquitoes** that carry yellow fever, dengue, chikungunya and Zika viruses
- **rats**, which can carry plague and other serious diseases
- **toads**, like the Asian black-spined toad, which could become as big a pest as the cane toad
- **reptiles**, which could colonise ecosystems or carry exotic reptile diseases
- **timber pests**, including drywood termites
- **marine pests**, especially molluscs, carried on ships' hulls (biofouling) or in ballast water.

Contaminants such as soil and seeds also pose biosecurity risks:

- **Soil contamination** of sea containers, vehicles and machinery risks introducing small invertebrate pests such as ants or slugs and exotic nematode, fungal, bacterial or viral pathogens of plants and animals.
- **Seed contamination** risks importing new weed species and seed-borne plant pathogens. Risks to agriculture and the environment are exacerbated if contaminated containers, vehicles or machinery reach or pass through rural destinations.

2 Hitchhiker pest and contaminant risk management

International measures have been developed to manage some key hitchhiker and contaminant risks to human, agricultural and environmental health by targeting the biology and known global distribution of the worst pests. The Australian Government Department of Agriculture and Water Resources (the department) works with international, national and state and territory agencies and industry to implement these measures and a range of other multilateral, bilateral and national programs pre-border, at the border and post-border. It aims to keep risks offshore as far as practicable but also applies stringent border monitoring and some post-border surveillance. These controls reduce the risk of many hitchhikers and contaminants entering the country, but absolute prevention is unattainable.

3 Sea vessel entry pathway

Biosecurity risks associated with shipping are managed through the Maritime Arrivals Reporting System (MARS). All vessels (other than small non-commercial vessels, such as private yachts) coming to an Australian first point of entry must first submit online details of biosecurity status and last port of call pre-arrival. The department then assesses risks; applies necessary inspections, treatments and certification; and records findings online—providing timely and transparent feedback to ships' masters, shipping lines and biosecurity staff.

The department operates a Vessel Compliance Scheme (VCS) through MARS to facilitate risk-based, targeted inspections. Each ship arriving in Australia will require biosecurity inspection unless a risk-based assessment exempts that voyage. Under the VCS, vessels have their inspection rate reduced to 40 per cent of voyages if they made at least three voyages to Australia in the previous 12 months and all voyages had satisfactory biosecurity compliance.

Demerit points are applied to ships and ships' masters if inspections reveal problems such as rodent or insect infestations, seeds or other organic matter on deck, failure to clean decks or improper ballast water management. Vessels that incur more than 10 demerit points at one inspection or 20 or more demerit points over three voyages are subsequently subject to the standard 100 per cent inspection rate, until they earn a reduced inspection rate again.

In 2017, 17,842 vessels entered Australia. Of those, 75 per cent (13,382 vessels) were subject to at least one inspection. The VCS failure rate was 2.7 per cent of total inspections. Naval vessels failed at over twice this rate, and cruise ships failed less than 1 per cent of inspections.

MARS and VCS have been well received by the shipping industry and have improved the department's ability to manage biosecurity risks. MARS software should be improved to:

- include the ability to record several previously visited ports rather than just the last port of call so that hitchhiker pest risks can be more accurately assessed
- prepare summary reports for departmental decision-makers and operational staff, and industry, to facilitate timely and targeted risk management.

4 Sea container entry pathway

Hitchhikers and contaminants can be found on the external and internal surfaces of sea containers. High (and increasing) numbers of containers arrive in Australia each year. Almost half come from China, and they mostly arrive at Melbourne, Sydney and Brisbane.

Until 2009 the department inspected 100 per cent of containers externally as they left the wharf gate. This was resource-intensive, and over 98 per cent of containers passed inspection.

Sea Container Risk Management Policy, 2010–2018

In 2010 the department formulated the Sea Container Risk Management Policy (SCRMP). External contamination risks were to be managed by:

- intensive six-sided on-wharf inspections of all containers that had been last loaded at one of 43 country action list (CAL) countries to find any giant African snails, other pests or soil
- three- to four-sided wharf-gate inspections of other (non-CAL) containers, initially at a rate of 30 per cent—with this rate intended to reduce over time based on risk profiling
- wharf-gate inspections of all containers to be moved from ports by rail or truck through rural areas to any destination (known as rural transit inspections)
- rural tailgate inspections—external and internal (tailgate) inspection of all containers to be moved to a rural postcode, done at the wharf or an approved arrangement site

Internal contamination risks were to be managed largely by:

- rural tailgate inspections, as noted above
- empty container surveillance—targeted inspection of empty containers leaving the wharf or at container parks by industry-based authorised officers.

Containers failing any of these inspections would be referred for external and/or internal cleaning or treatment as required and then reinspected and released (if no more pests or contaminants were found).

In 2010 the department implemented the offshore Sea Container Hygiene System (SCHS), which had been developed by New Zealand in 2006. Participating shipping lines operating out of some Pacific region CAL countries work with their port authorities to implement agreed pre-export container washing, inspection, treatment and storage protocols. The department reduced inspection rates for shipments of CAL containers that are SCHS compliant.

Implementation and results

Between 2014 and 2017, 11.3 million containers were imported into Australia. Of those, 10.7 per cent (1.2 million) were inspected in some way and 1.9 per cent (22,260) were found to be contaminated.

CAL containers made up only 2.5 per cent of all containers entering Australia between 2009–10 and 2016–17, but the department's intensive inspections found that 20 per cent of those were contaminated. However, the proportion found to be contaminated halved over the period, indicating that the SCHS was leading to a gradual reduction in the number of contaminated containers arriving in Australia.

Wharf-gate inspections of non-CAL containers declined from 30 per cent in 2010 to less than 5 per cent in 2017. This was apparently due to insufficient availability of inspection resources to service the SCRMP policy rather than results of risk profiling. In 2015–16, 8.9 per cent of 2.7 million non-CAL containers were externally inspected. Of those, 0.7 per cent were found to have high-level contamination, especially with soil and/or plant material. In 2015–16 and 2016–17, 5.7 million containers were released uninspected. It is likely that at least 42,000 of these were highly contaminated, presenting unmitigated potentially serious biosecurity risks.

Rural transit inspections were rarely implemented because of resource constraints and difficulties in profiling containers. As a result, the risk of hitchhiker pests and contaminants being released into the environment during container transport through rural areas remained unmitigated. It is unclear how many containers underwent rural transit.

Rural tailgate inspections for internal contamination were applied to all containers destined for rural postcodes, but the number of rural postcodes has decreased with progressive peri-urban development. Between 2012–13 and 2016–17 the department conducted about 265,000 rural tailgate inspections. Of those, 12.4 per cent (32,860) were non-compliant. In 2015–16, 15.6 per cent (8,147) were non-compliant—possibly indicating that the internal contamination rate across all containers is increasing.

Integrated risk and compliance model

The department is developing an integrated risk and compliance model (IRCM) to manage sea container biosecurity risks. Under the IRCM, the CAL country rating of high or low external risk will be replaced. The external risk of each container will be rated as high, medium or low based on recent history of detections of all hitchhikers and contaminants in its country and port of origin. All high-risk containers and 50 per cent of medium-risk containers will be subject to six-sided inspection, and 5 per cent of low-risk containers destined for non-rural postcodes will be subject to wharf-gate inspections.

Containers destined for rural destinations will be classed as high- or low-risk based on external risk profiles of country and port of origin and historical non-compliance data for internal contamination. Low-risk containers can be inspected by approved persons at approved facilities (potentially halving the inspection burden for biosecurity inspectors and reducing cost to industry). High-risk containers will continue to be inspected by biosecurity officers at wharves or approved arrangement sites.

Modelling of the potential impact of the IRCM using past data showed that it could have captured 60 per cent more high-level contamination and reduced departmental inspection costs by about 8 per cent. In 2014–15 an extra 26,000 six-sided inspections and 100,000 fewer wharf-gate inspections would have been carried out. However, wharf-gate inspections have already dropped below 5 per cent, so the policy will not lead to further savings.

Upgrading S-Cargo software to profile and manage sea containers

Biosecurity officers who are profiling and managing sea containers for external and internal biosecurity risk mitigation currently access the Australian Government Department of Home Affairs' Integrated Cargo System (ICS) via the Department of Agriculture and Water Resources' S-Cargo software program. The department is upgrading S-Cargo so it can implement the IRCM policy. This software upgrade will facilitate revised classification of containers and directions to hold them for six-sided inspections, release them or select them for inspection as they exit the wharf gate. IRCM cannot be implemented until S-Cargo upgrades are finalised.

Stockpiling of high-risk containers

The risk of external hitchhiker pests escaping to nearby environments is increased when stevedores stockpile high-risk containers at wharves, which is commonly done until it is practical or operationally efficient to inspect them. Snails can be effectively prevented from leaving the area if cargo is surrounded with a ring of salt or snail baits, but this approach is not effective against other pests. In 2014 a red imported fire ant nest was found on a public road verge just outside the high-risk container holding area of Port Botany, Sydney. This risk-management failure could be repeated.

Automated container inspection systems

A biosecurity officer takes at least 10 minutes per container to conduct an external six-sided inspection. These inspections are difficult and repetitive, and they must be done regardless of weather. These factors affect workplace health and safety. Despite their intensive inspection of crevices, biosecurity officers may not detect small insect pests. Wharf-gate inspections are far less efficient and are only likely to detect gross soil contamination or large pests like giant African snails, because ants and other pests may remain hidden. Manual inspections at current or proposed levels are unlikely to mitigate these risks.

CSIRO is researching the potential for robotic or other automated container inspection systems to detect biosecurity risk material as containers are unloaded or stored at wharves. These efforts could develop more effective and efficient systems and should continue.

Cleaning of externally contaminated containers

The department normally refers externally contaminated containers to approved arrangement sites near major ports for washing and reinspection. These facilities are already crowded and busy. Any increase in detection of contaminated containers, as projected under the IRCM, would put some under extreme pressure.

Between 2010 and 2015 an automated container washing system operated successfully at Port Fremantle. It used recycled water to clean all six sides of a shipping container to a high standard within five minutes, compared with about 20 minutes for manual cleaning and 10 minutes for 6-sided inspection. Installation of automated container washing facilities at major container receival ports could reduce the need for biosecurity officers to inspect all high- and medium-risk containers, divert contaminated containers for washing and reinspect cleaned containers. Cleaning all containers from high- and medium-risk countries or ports could help improve biosecurity outcomes and result in less disruption to trade. It would also greatly reduce pre-inspection stockpiling of risky containers. However, means of collecting information by which the containers are classified, to provide incentives for offshore container risk management, would need consideration.

The volume of containers transported from ports by rail to intermodal transport hubs around Sydney and Melbourne is projected to increase, and pressure is mounting to have major container receival facilities built at Newcastle. This increased transhipping of containers will in turn increase risks of highly contaminated containers spreading pests far and wide, and also increase the cost of inspecting and washing containers at other distributed facilities. These risks could be far better managed by incorporating automatic container washing facilities into new rail infrastructure so containers can be cleaned before they are taken from the wharf.

5 Break-bulk cargo and bulk cargo ships' holds entry pathways

Break-bulk cargo poses specific contamination risks, addressed case by case by biosecurity officers. Break-bulk cargo from high-risk (CAL) countries or cargo that otherwise carries the risk of harbouring seasonal pests (such as the brown marmorated stink bug) must be inspected at the first point of entry before it is taken from the wharf. High-risk break-bulk cargo must be wrapped in a tarpaulin before it is moved from the wharf to an approved arrangement site for inspection or treatment. This prevents the escape of any pest or contaminant during transport.

Hitchhikers and/or contaminants are frequently found in used cars and farm machinery. Even new cars and tractors may be heavily contaminated with seeds that have blown and stuck onto them before export to Australia. If biosecurity officers detect seeds or other biosecurity risk material that is over permissible thresholds, the whole consignment must be inspected in detail. It will be cleaned at an approved facility to remove any visible seeds, then reinspected. Any insects or snails are sent to departmental scientists for identification while cargo is held. If regulated pests are found, the cargo must be fumigated or treated appropriately.

Commendably, the department's offshore inspection and cleaning arrangements, especially with Thailand, have greatly reduced inspection failure rates of new car consignments. This scheme is being expanded to cover some new cars from Japan and the Republic of Korea.

Between 2011–12 and 2016–17, 60,855 break-bulk cargo consignments arrived in Australia. Of these, 30 per cent were identified as having a biosecurity risk, 25 per cent were cleaned and 0.5 per cent were fumigated with methyl bromide. Of those fumigated, 10 per cent were fumigated at a rate high enough to kill giant African snails and the remaining 90 per cent were fumigated at a lower rate sufficient to kill the other pests that were detected. Efforts to move away from methyl bromide as a fumigant need to be increased.

The department and its overseas and industry collaborators appear to be effectively managing external biosecurity risks associated with break-bulk cargo. However, inspection resources may be stretched by large, complex consignments, and this may result in reduced inspection rates. This ongoing risk must be addressed by adequate supply of well-trained staff.

Bulk cargo ships' holds may contain cargo residues (such as remnants of plant-based stockfeeds) that can provide habitat or food for hitchhiker pests and specific grain pests and diseases, like khapra beetle or Karnal bunt. Biosecurity officers carry out complex and often dangerous ship-hold inspections for bulk carriers of risk material where cleanliness must be assured between shipments. New technologies may lead to automated inspection processes for ships' holds, and departmental support for this research should continue.

6 Aircraft and air cargo entry pathway

The biosecurity risk of aircraft and air cargo carrying hitchhikers and contaminants is relatively low (despite the possible presence of insects, especially mosquitoes, and occasionally other animals). The department manages this pathway effectively through oversight of aircraft disinsection measures and pratique assessment.

7 Seasonal hitchhiker pest risk management

Since December 2014 very large numbers of **brown marmorated stink bugs** (BMSB) have been identified in sea cargo, especially in break-bulk and some containerised cargo shipped from the United States between the months of September and April each year. Since 2016 the department has focused on break-bulk and containerised cargo shipped between September and April, especially from Italian ports—due to the spread of BMSB into Europe. In 2017–18 an upsurge in bug interceptions and several post-border detections showed that offshore fumigation had been unreliable. As a result, the department required fumigation on arrival of containerised cargo coming from Italian ports. This caused short-term disruption to cargo handling on arrival and significantly increased departmental workload and pressure on an already stressed biosecurity system. BMSB remains a major threat to both Australia and New Zealand and an intensive program to combat it will need to continue, with offshore, border and post-border interventions.

In recent years, **Asian gypsy moth** inspections have been selectively undertaken by port of origin, pathway and season (due to heightened risk between January and May). Recently, far more Asian gypsy moths have been found during pre-export inspections. This has led to fewer whole-of-ship targeted inspections and fewer moth interceptions on arrival—a successful outcome.

Burnt pine longicorn beetle risks are managed through surveillance and timber fumigation offshore (in New Zealand) and onshore, especially in the risk season from November to May. The department is looking to better manage burnt pine longicorn beetle incursion risks through improved vessel reporting.

8 Other key hitchhiker pests

Management of **exotic invasive ants** requires targeted surveillance at and near ports—including inspection for nests and regularly monitoring purpose-built traps. The department reports all detections to the relevant state/territory departments and port neighbours so the response can be integrated. Ants represent an increasing threat, and their management will require sustained effort.

Exotic bees and bee mites are monitored at and near major ports through strategic placement and regular monitoring of sentinel hives and other traps. Asian honey bee populations have established in Cairns, but no other exotic bee species have established on the Australian mainland. Cooperative surveillance run by the department, state and territory agencies and beekeepers shows that Australia remains free of most Varroa and other key exotic mites.

9 Conclusion

The challenge for Australia in managing hitchhiker pests and contaminants is increasing because of greater global trade and movement of pests and diseases around the world. Many other countries may not prioritise preventive measures because certain pests may be endemic or not pose as great a risk to them as they do to Australia.

The department should continue to develop its offshore risk management programs, using incentive-based compliance systems for importers and shipping lines that transport containers and break-bulk cargo that meet biosecurity requirements.

It is likely that the volume of sea containers entering Australia will continue to rise steadily. Improved external and internal contamination risk profiling for targeted intervention will be necessary but insufficient to manage future challenges.

The department is not sufficiently managing the risk of external contamination of sea containers. Current inspection and cleaning regimes are cumbersome and will not cope with expected increases in container numbers or development of ever-faster cargo transport systems (such as rail to intermodal hubs). Automated container inspection and cleaning could improve efficiency and effectiveness across the whole system; therefore, industry and government should prioritise it.

Automated container washing at major container receival ports could result in a far greater percentage of high- and medium-risk containers, and those to be transported by rail, being satisfactorily cleaned before they are moved from the wharf. This may provide the biggest short-term reduction in external biosecurity risk. The development and validation of automated inspection methods could further improve the system.

The risk of sea containers carrying pests internally is also increasing—evident because more hitchhiker pests have been found in recent years. The department's rural tailgate inspection program seems to be effective in protecting rural postcode destinations but a greater level of internal inspection may be required for others. The national border surveillance program, and increased levels of engagement with industry and with state and territory governments are also essential for early detection of pests that breach border biosecurity controls.

In the future the department may be able to reduce border effort by using automated systems and offshore schemes. However, it cannot even implement its existing risk management policies properly due to staffing pressures. This is greatly slowing development of new and adaptive policies. Adequate long-term resourcing of current programs and frontline inspection services—and ongoing development of improved systems—will be essential to long-term biosecurity risk management. Without this, Australia risks being overwhelmed by biosecurity threats posed by increasing trade volumes and changing global pest and disease threats.

Nevertheless, the department's efforts to intercept and exterminate hitchhikers and contaminants are preventing a great deal of biosecurity risk material, pests and diseases from entering Australia. This is of huge value not just to agriculture and human health but also to the environment and the Australian way of life.

Recommendations

The full departmental response to the recommendations is at Appendix A

Recommendation 1

The department should modify the MARS software so it can provide:

- ability for ships' masters to list up to five prior overseas ports of call when submitting a Pre-Arrival Report,
- real-time reporting and visualisation of MARS inspection data and missed inspections, including reasons by port and ship type, for all biosecurity officers and managers, and
- better summary reports for departmental decision-makers and operational staff, and industry, to facilitate timely and targeted risk management.

Department's response: Agreed.

The above recommended modifications have been prioritised for future MARS releases.

Recommendation 2

The department should expedite the upgrading of the S-Cargo software system so it can better manage container and cargo contamination risks, including rural tailgate container inspections.

Department's response: Agreed.

The department is progressing the enhancements to the S-Cargo software system as a priority. These enhancements will strengthen the department's ability to manage the biosecurity risks entering Australia on the surfaces of sea containers and breakbulk cargo. However, the department's ability to better manage container risks is also reliant on the progression of profile changes in the Integrated Cargo System (ICS). As rural tailgate inspections cannot be managed through the S-Cargo system, the department is considering enhancements to the Agriculture Import Management Systems (AIMS) to implement reforms to rural tailgate inspections. In addition, the department is developing a mobile tailgate application for inspectors to capture inspection results.

Recommendation 3

The department should prioritise allocating resources to expand the Sea Container Hygiene System, to enable better offshore management of sea container biosecurity risks from more countries and ports.

Department's response: Agreed.

The department will ensure adequate resources are allocated to prioritise expansion of the Sea Container Hygiene System (SCHS) to more countries and ports. However, the uptake of SCHS is dependent on the level of interest shown by industry and overseas government agencies.

Recommendation 4

The department should require major sea container receival operators to clean high and medium external risk containers to an acceptable standard before they are transported from the port, removing the need for most on-wharf six-sided inspections and subsequent manual cleaning when biosecurity risk material is found. Automated cleaning facilities should also be built into rail infrastructure installed to transport containers to intermodal hubs so that all containers being transported by rail are cleaned before leaving the port, while low risk containers leaving by truck continue to be subject to risk-based wharf gate inspections.

Department's response: Agreed in principle.

The department notes the role of automated methods of container cleaning in risk management of sea containers. However, introduction of automated cleaning facilities could conflict with the promotion and expansion of offshore management options (recommendation 3 refers). Further, the effectiveness of these facilities in managing hitchhiker pests and molluscs needs to be assessed. In light of this recommendation, the department, in consultation with industry, will assess the impact of the introduction of these facilities on efficiency of container management at ports and whether mandating a specific technology solution is warranted. The department will consult with industry as part of this assessment.

Recommendation 5

The department should continue to reduce its dependence on methyl bromide gas for fumigation and consider assessing and approving alternative treatments.

Department's response: Agreed.

The department is continuing to investigate alternatives to methyl bromide gas for fumigation and is also continuing to assess and approve alternative treatments where relevant.

Recommendation 6

The department should develop a comprehensive training and rotation program to maintain a pool of competent biosecurity officers with expertise in specialised inspection areas and the experience necessary to cope with peaks in import inspection demand. This program should be regularly reviewed and adequately resourced.

Department's response: Agreed.

The department is further strengthening its training and workforce allocation processes to ensure that specialist biosecurity functions, such as break-bulk cargo inspections, are undertaken by a well-trained and competent workforce in a dynamic demand-driven environment.

Recommendation 7

The department should continue to work with research and development organisations and industry to develop automated inspection capability for containers and for ship bulk cargo holds and hulls.

Department's response: Agreed.

The department is currently working with a research organisation to explore the potential use of emerging scanning technologies to automatically detect the presence of pests or contamination.

Recommendation 8

The department should develop a policy framework for biosecurity management of aircraft similar to its policy for the biosecurity management of commercial vessels.

Department's response: Agreed.

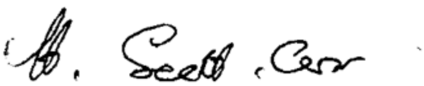
Work has already commenced to develop a policy framework for biosecurity management of aircraft.

Recommendation 9

The department and state/territory government agencies, industry and port authorities should agree on and cost share measures for monitoring and minimising risks of hitchhiker pests near first points of entry, container parks, intermodal transport hubs and approved arrangement sites.

Department's response: Agreed in principle.

The department will continue to consult and negotiate with all governments, as well as stakeholders, to build on the existing cost sharing arrangements.



Dr Helen Scott-Orr
Inspector-General of Biosecurity
13 July 2018

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Chapter 1
Challenges for Australia

1.1 Hitchhiker and contaminant biosecurity risks increasing

Australia remains free of many significant pests and diseases because it maintains strong biosecurity systems. However, the flow of vessels, goods and passengers into Australia is rapidly increasing. This presents biosecurity risks in two ways:

- The imported goods themselves may pose a direct biosecurity risk because of the origin or type of material being imported.
- The sea and air vessels that transport goods may carry pests, including pathogens—for example, on or inside sea containers and on cargo which would not of itself pose biosecurity risks.

Imported goods, cargo containers and conveyances (defined in the *Biosecurity Act 2015*) may all be contaminated with living material, whether mobile (insects or rodents) or not (seeds), and non-living material such as soil, which can carry living material.

Examples of hitchhikers and contaminants and where they may be found are given in Table 1.

The distribution of pests and diseases is strongly influenced by trends in trade and transport. Historically, the rise in global exploration and the industrial revolution caused significant introductions of invasive pests and exotic diseases. Since the mid-20th century, increased income growth due to globalisation has strongly correlated with increasing richness of invasive species in both island and continental countries (Hulme 2009). Also, advances in supply chain efficiency, along with growing commodity and transport demand, have increased the rate at which goods can be moved, thus increasing the risk that hitchhiker pests and contaminants will break through biosecurity lines. Risks to agriculture and the environment are exacerbated if the goods go to or through rural areas. Therefore, the measures we use to manage these increasing risks need to be regularly reviewed and adapted.

TABLE 1 Terrestrial hitchhiker pest and contaminant examples

Hitchhiker and contaminant examples	Typical locations
Red imported fire ant (*Solenopsis invicta*), Yellow crazy ant (*Anoplolepis gracilipes*), Electric ant (*Wasmannia auropunctata*)	Inside or outside of a sea container
Asian gypsy moth (*Lymantria dispar*)	Superstructure of a sea vessel, outside walls of a sea container
Giant African snail (*Achatina fulica*), Green snail (*Cantareus apertus*)	Underside of a sea container
Madagascar day gecko (*Phelsuma madagascariensis madagascariensis*)	Inside or underside of a sea container
Asian black-spined toad (*Bufo melanostictus*)	Inside sea container
Exotic bees	Vessels, aircraft holds, vehicle interiors
Brown marmorated stink bug (*Halyomorpha halys*)	Break-bulk and containerised cargo
Burnt pine longicorn beetle (*Arhopalus ferus*)	Deck of a sea vessel
Rats and mice as vectors of numerous human diseases—plague, hantavirus	Cargo vessel holds and food storage areas
Weed seeds	Underside of sea containers
Seed-borne plant pathogens	External surfaces of new cars and machinery
Soil—Exotic invasive ants	Underside of sea containers
Soil—Fungi and nematodes	External surfaces of new cars and machinery
Food and organic residues as a food source for pests such as insects, rodents	Inside air container
Plant and animal material as a source of plant or animal diseases	Inside sea container
Invasive mosquito breeding spot	Vessel decks, break-bulk cargo, especially tyres

Source: Department of Agriculture and Water Resources

1.2 Terrestrial hitchhiker pests and contaminants

1.2.1 Hitchhiker pests

A hitchhiker pest is a live insect or other animal that has an opportunistic association with a commodity or item with which it has no biological host relationship. Successful hitchhiker pests may:

- be attracted to habitats modified by humans
- be able to complete their life cycle in human environments or highly disturbed habitats
- have life stages that require sheltered areas to avoid extreme conditions or to escape detection
- have life stages involving dormancy, allowing them to survive extended periods in transit, and/or
- have links with common contaminants like soil or plant material (Toy & Newfield 2010).

Many key hitchhiker pests can potentially have very strong invasive impact. Therefore, special programs have been devised to combat them, both internationally and in Australia. These pests include:

- **giant African snails** (*Achatina fulica*), which feed voraciously on over 500 species of plants, including vegetables, fruits, ornamentals and eucalypts
- **exotic invasive ants** such as the red imported fire ant (*Solenopsis invicta*), against which a $411.4 million national eradication program is currently operating
- **exotic bees**, such as the Africanised honey bee (*Apis mellifera*) and bee pests such as the *Varroa destructor mite*, which could imperil Australia's honey bee populations and the pollination and production of many crops.

In addition, many seasonal pests require targeted surveillance and control measures in Australia. They include:

- **brown marmorated stink bugs** (*Halyomorpha halys*), which are a major horticultural, environmental and household pest
- **Asian gypsy moths** (*Lymantria dispar*), a destructive pest of over 650 species of trees
- **burnt pine longicorn beetles** (*Arhopalus ferus*), which attack burnt or harvested pine timber, threatening forestry and construction industries.

Other hitchhiker pests are managed through ongoing specific and/or general programs. They include:

- **invasive vector mosquitoes**, which can carry yellow fever, dengue and Zika viruses
- **rats**, which may carry plague and other serious diseases
- **toads**, such as the Asian black-spined toad (*Bufo melanostictus*), which could become as great a pest as the cane toad
- **reptiles**, which could colonise some ecosystems or carry exotic reptile diseases
- **marine pests**, especially molluscs, travelling on ships' hulls (biofouling) or in ballast water.

Recently, there have been several high-profile examples of hitchhiker pests entering Australia:

- In early 2018 a major increase in the number of brown marmorated stink bugs in a wide variety of sea cargo, particularly from Italy, caused considerable disruption to cargo entry into Australia and incursions into New South Wales, Queensland and Western Australia.
- In 2016 khapra beetles (*Trogoderma granarium*) were discovered in a container-load of empty plastic food containers (Day & White 2016).
- In June 2016 Asian honey bees (*Apis cerana*) infested with *Varroa jacobsoni* mites entered Townsville (QDAF 2017).

1.2.2 Contaminants

Contaminants, also known as 'biosecurity risk material' (BRM), include soil, seeds, other plant material, food residues, faeces or animal remains that are opportunistically associated with a commodity or item.

Small invertebrate pests such as ants or slugs, as well as exotic nematode, fungal, bacterial or viral pathogens of both plants and animals, can be imported through soil contamination of sea and air containers, vehicles, tyres or machinery. New weed species, or seed-borne pathogens that may affect both native and introduced plant species, can be imported through seed contamination of commodities or items.

Almost any object can become contaminated as it moves through the import pathway, but there are some common patterns. Soil from storage and transport prior to shipping will stick to container undersides. It is often found on used earthmoving and agricultural machinery. Food residues are more common inside sea and air containers. Light, wind-dispersed seeds may stick to rough, sticky or statically-charged parts of vehicles and machinery. New cars may become contaminated during extended periods on wharves or transport during storm events. Studies have found that the diversity of seed carried by cars is very high, indicating vehicles can be an important mechanism for seed dispersal (Zwaenepoel et al. 2006). A study in 2005 recorded seeds from over 230 taxa, including 23 noxious weeds, on a range of vehicles in south-eastern Australia (Moerkerk 2006).

1.2.3 Impacts of hitchhiker and contaminant entry

Table 2 shows estimates of long-term economic losses to agriculture resulting from one occurrence of the entry, establishment and spread of key organisms of terrestrial biosecurity concern which could enter on or in containers (Hafi & Addai 2014). Potential impacts on pets, the environment, infrastructure, human health and social amenity could also be significant (Parsons & Arrowsmith 2014) but were not included in these calculations (RRRA 2016).

TABLE 2 Potential cost to agriculture of pest incursions, 2010–15

Organism of concern	Cost to agriculture ($ million)
Asian gypsy moth	1,700
Broadacre fungus	600
Broadacre mollusc	500
Broadacre virus	600
Broadacre weed	1,600
Giant African snail	1,500
Horticulture fungus	700
Horticulture mollusc	500
Horticulture virus	700
Horticulture weed	1,000
Khapra beetle	15,500
Livestock bug thrips mite	1,600
Non-agricultural bee wasp	70
Non-agricultural weed	70
Exotic invasive ant	850

Source: Department of Agriculture and Water Resources

1.3 Marine hitchhiker and contaminant risks

Marine pests and pathogens can spread internationally through ballast water or biofouling. Ships take on ballast water to maintain stability and navigate safely. Water volumes can range from a few hundred litres up to more than 10 million litres per ship, transporting thousands of aquatic microbes, plants and animals around the globe. Over 7,000 marine species travel daily, and around 10 billion tonnes of ballast water are transported annually. Unmanaged ballast water released in Australian ports could introduce exotic invasive marine species.

Biofouling (or hull fouling) is the accumulation of aquatic organisms—microorganisms, plants and animals—on surfaces and structures, such as ships' hulls, that are immersed in or exposed to the aquatic environment. Biofouling occurs on all types of vessels, from large ships to small recreational vessels (Box 1). It can also spread exotic marine pests and diseases that harm fisheries, threaten healthy fish habitats and have adverse economic and health effects.

Box 1 Mussels, ballast water and biofouling: an unsavoury mix

Zebra mussels (*Dreissena polymorpha*) are prolific underwater colonisers. They damage water treatment and power plants, ships, harbours and waterways and displace native aquatic species.

Zebra mussels are native to the lakes of southern Russia and Ukraine. However, they have now invaded North America and Europe. They were found in the Canadian Great Lakes in 1980. The infestation was shown to have come in with ballast water. By 1993 they had spread from Quebec to Louisiana. By 1996 zebra mussel management in the Great Lakes was costing between US$100 million and $400 million annually (NRC 1996).

In 1999 **black striped mussels (*Mytilopsis sallei*)** were detected in Darwin Harbour in Australia. They probably arrived by biofouling. They were successfully eradicated within a month of detection, but 160,000 litres of chlorine and 6,000 tonnes of copper sulphate had to be applied to the infested marina and ships. The eradication cost $2.2 million (DEH 2000).

Chapter 2

Hitchhiker pest and contaminant risk management

2.1 International measures

International measures to manage key hitchhiker pest and contaminant risks have been successfully implemented for many years.

The World Health Organization (WHO) has applied longstanding measures to manage pests and contaminants that threaten human health (WHO 2011), notably rats (Ship Sanitation Certification Scheme) and invasive vector mosquitoes (Aircraft Disinsection).

The International Plant Protection Convention (IPPC) has developed International Standards for Phytosanitary Measures (ISPMs), such as ISPM15 for timber packaging, for a wide range of plant pest management processes and entry pathways, including some for serious hitchhiker pests. Some standards—for example, a standard for sea container cleanliness—are still being negotiated.

The International Maritime Organization (IMO), International Labour Organization and United Nations Economic Commission for Europe have developed the Code of Practice for Packing of Cargo Transport Units (CTU Code). The CTU Code gives advice on the safe packing of containerised cargo and on how to help minimise the risks of phytosanitary contamination of containers during packing and movement along the supply chain.

In 2016 the IPPC Commission on Phytosanitary Measures endorsed a Sea Container Complementary Action Plan (SCCAP) to reduce the pest risks associated with sea containers. The department is a member of the Sea Container Task Force that is overseeing SCAAP implementation. SCCAP includes measures to increase pest risk awareness and monitor the uptake and impact of the CTU Code on container contamination.

Australia is preparing a guideline for a sea container cleanliness survey, which will be used to monitor the implementation of the CTU Code. An action from the draft national invasive ant plan is to 'Support development of an international shipping container standard'.

The IMO has developed the *Guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species* (International Maritime Organization 2012), as well as an International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention). The Ballast Water Convention came into effect in September 2017.

The Biosecurity Amendment (Ballast Water and Other Measures) Bill 2016 amended the *Biosecurity Act 2015* to make Australia fully compliant with the Ballast Water Convention management of ballast water and change the control and management of ships' ballast water to reduce the risk of invasive marine pests and pathogens entering Australian waters.

2.2 National measures

2.2.1 Overall management

Australia works cooperatively with its trading partners and neighbouring countries to implement these international conventions. It gives effect to them through programs mainly developed and implemented by the Australian Government Department of Agriculture and Water Resources (the department). Programs involving human health are managed jointly with the Department of Health. Those involving military biosecurity are managed jointly with the Department of Defence.

Separate controls for some of the worst specific pests target their biology and known global distribution. Other general controls are also applied to reduce risks of many hitchhikers and contaminants entering the country, although absolute prevention is unattainable.

External container and break-bulk contamination risk is managed by vessel, container and cargo inspections with subsequent treatment where needed. Vessels are selected for inspection based on the risk profile of the vessel, container and cargo. This in turn is often determined by the country or port of origin.

Internal container contamination is managed by risk-based container and cargo inspections. The risk is often determined by importer declarations and potential destinations of the goods.

In both cases, biosecurity officers determine the presence and level of contamination before deciding on further cleaning or management procedures, unless they can verify that appropriate offshore risk management measures have been applied.

Specific programs manage hitchhiker pest and contaminant biosecurity risks pathway by pathway and pest by pest. These programs comply or harmonise with international measures where available. Australia also has a range of bilateral or multilateral arrangements to manage specific risks from specific countries. In particular, the department works very closely with New Zealand to manage a number of common hitchhiker pest and contaminant risks.

A separate risk analysis and appropriate management program is required for each pathway by which biosecurity risk material may enter Australia, considering the risk of:

- the probability and frequency of hitchhikers or volume of contamination arriving
- the location of arrival
- the potential for a pest or disease to establish itself in the environment
- the potential cost of the pest or disease if established.

2.2.2 Biosecurity risk profiling

Risk profiles for **incoming ships** are developed when the captain or person in charge of the vessel formally notifies the department of the intended time and place of arrival. Various details are used to make a biosecurity risk assessment before the vessel arrives in Australia. Based on this risk assessment, various types of inspections and/or treatments are ordered.

Incoming aircraft pose lower risks, which are not generally profiled by the department. The department sometimes works with the Department of Health to profile seasonal mosquito risk of planes coming from certain ports and to conduct extra aircraft disinsection activities as needed.

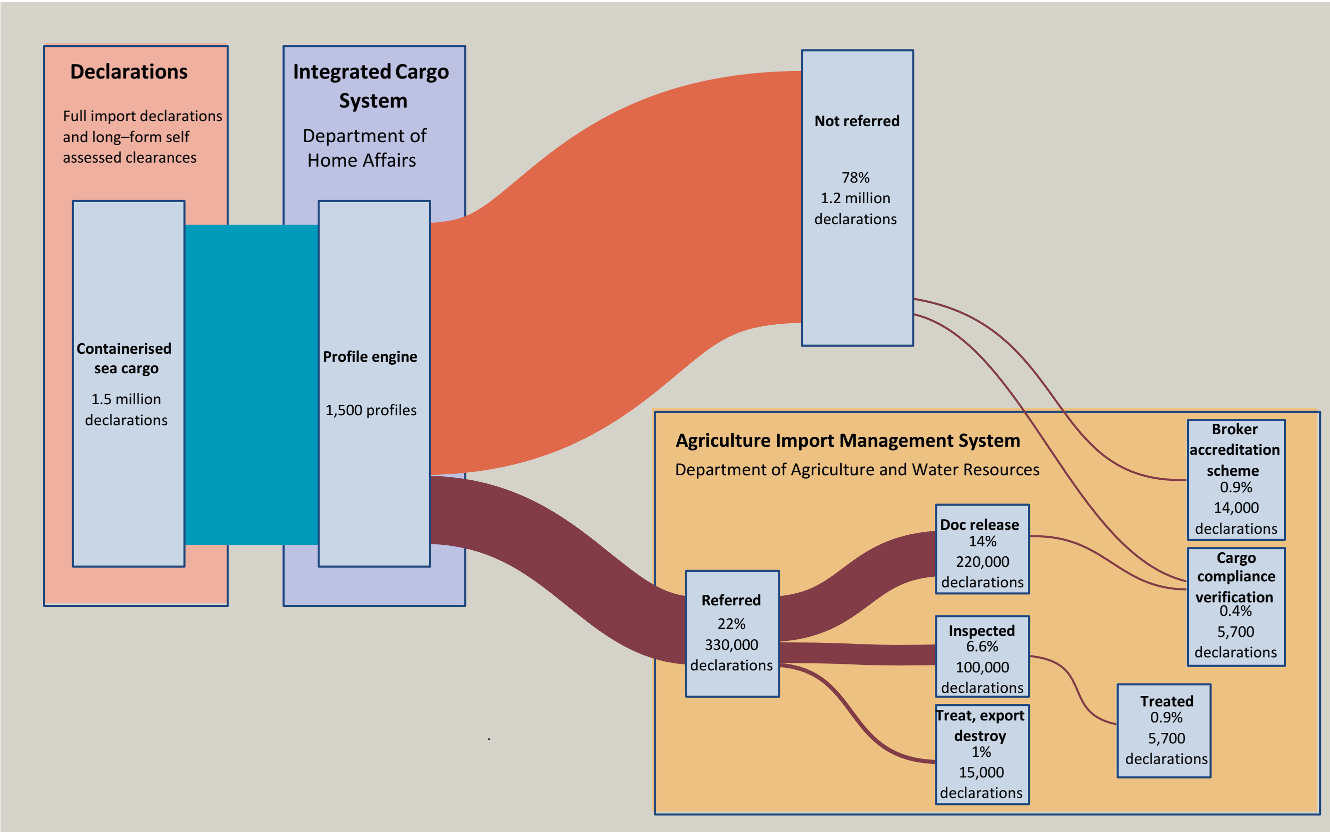
Imported cargo risk profiling is managed by the department through the Integrated Cargo System (ICS)—a database owned and managed by the Australian Border Force within the Australian Government Department of Home Affairs (DHA). ICS is the only method of reporting the movement of goods, including the shipment type, across Australia's borders. It controls cargo shipment and delegation on to the department's Agriculture Import Management System (Figure 1). By agreement with DHA, the department uses ICS to identify and flag imported containers and non-containerised cargo with an elevated biosecurity risk profile. Biosecurity officers may use ICS to gather further information on cargo or to place or lift holds on identified shipments. Sea containers make up the great majority of the sea cargo and details of goods matching certain risk profiles are sent to one of the departmental systems:

- S-Cargo—for biosecurity risks of sea containers and break-bulk cargo
- Agriculture Import Management System (AIMS)—for risks associated with goods
- Mail and Passenger System (MAPS)—for risks associated with mail and passengers
- Self-Assessed Cargo (SAC) database—for risks of incoming goods and mail valued at $1,000 or less (typically, goods bought from internet markets like Amazon and eBay).

Goods that do not match a risk profile are cleared to continue the import process without further intervention. Any actions that occur within the departmental systems outlined above are communicated back to ICS, which then communicates the actions to the relevant client.

Sea container and break-bulk cargo risk profiling for external or internal hitchhiker and contaminant risks is undertaken by the department's Cargo and Mail section. These goods may pose a higher risk if they come from a particular region, country or port known to contain certain pests or diseases at certain seasons or where poor hygiene standards apply. For cargo travelling to or through rural areas, there may be a greater risk of pests or pathogens coming into contact with host plants or animal populations. The profiling determines whether or not cargo will be referred for biosecurity intervention (Figure 1).

FIGURE 1 Composite view of sea cargo processing, 2014–15



Note: Percentages shown are percentages of the total 1.5 million declarations.
Source: Department of Agriculture and Water Resources

Cargo cleanliness is managed through the department's non-commodity information requirements policy (Table 3). Arriving cargo and transport containers must be clean and free of contamination, with contamination risks addressed offshore where possible.

TABLE 3 Mechanisms to ensure cleanliness of consignments

Consignment type	Requirements
Full container load (FCL) sea cargo	Provision of a cleanliness statement on consignment-linked documentation stating 'The container(s) covered by this document has/have been cleaned and is/are free from material of animal and/or plant origin and soil'. For annual declarations provided by one shipper for one importer, stating 'The container(s) covered by this document will be cleaned and will be free from material of animal and/or plant origin and soil'. In either case, the document upon which the statement appears must have an identifiable link to the consignment for which it is being used. For a single consignment, this is usually the container number to which the statement applies; for annual declarations, the shipper and importer of the consignment must match those on the document containing the statement.
Less than container load (LCL) sea cargo	LCL cargo can only be deconsolidated at a location operating under a departmental approved arrangement where any contamination risk can be addressed.
Break-bulk cargo	Break-bulk cargo is subject to on-wharf surveillance inspections to identify any contamination. Many break-bulk commodities (for example, used machinery) have an intrinsic contamination risk and are subject to a detailed inspection to verify freedom from contamination as part of their commodity specific import requirements.
Unaccompanied personal effects	Cargo containing personal effects can only be deconsolidated at a location operating under a departmental approved arrangement where any contamination risk can be addressed.
Air cargo	Historically, air cargo containers have low levels of contamination. The risk of any contamination that does occur is mitigated, as air cargo containers rarely leave the airport precinct, and when they do they usually only travel to nearly warehouses, many of which are operating under departmental approved arrangement.
Transhipped goods	Transhipped goods are not imports, remain unopened while in Australia and may not leave the metropolitan area, thus posing only a limited risk.

Source: Department of Agriculture and Water Resources

2.3 Stakeholder engagement

2.3.1 Departmental pre-border, border and post-border engagement

The department works with many external stakeholders to implement hitchhiker and contamination risk management measures. It conducts extra surveillance using purpose-built traps or baits for particular pests at key points along specific pathways and against specific hitchhiker pests. The types of measures that are implemented depend on the pest's biology, global occurrence and potential impact if introduced into Australia.

Pre-border—Where possible, the department liaises with overseas competent authorities, port authorities, shipping agents, customs brokers and others to develop and apply adaptive offshore surveillance and treatment measures to keep pests offshore.

Border—The department manages risks at the border. Biosecurity officers conduct all assessments and high-risk inspections. In addition, approved arrangement service providers (authorised under the *Biosecurity Act 2015*) carry out many essential biosecurity functions, such as holding goods securely until they pass required inspections, cleaning different classes of containers and cargo, applying treatments such as fumigation, and disposing of biosecurity waste. One of the department's essential, although resource intensive, functions is to ensure that the various approved arrangement sites are compliant with their approval conditions and to provide them with ongoing training and risk awareness.

Post-border—Within Australia many biosecurity activities fall within the purview of states and territories, rather than the Commonwealth, due to constitutional separation of powers. The department cooperates with state and territory governments and relevant industries to conduct pest-specific, nationally agreed post-border surveillance and incursion response programs. The department also maintains a post-border detection hotline through which approved arrangement sites, port personnel and the community can report signs of exotic pests.

2.3.2 A New Zealand comparison—engagement with public and industry

Unlike Australia, New Zealand is not a federation of states and territories and has only national and local government levels. Therefore, its biosecurity management is simpler. Australia has 93 approved locations (30 air and 63 sea) where international vessels or aircraft may arrive, whereas New Zealand has 27 approved locations (13 air and 14 sea). New Zealand's smaller size and population increases the ability of the New Zealand Ministry for Primary Industry to flexibly deploy biosecurity resources and engage with the community.

The New Zealand population is highly engaged with biosecurity due to their appreciation of the natural environment, awareness of the economic value of agricultural exports, and active government engagement programs. The New Zealand Biosecurity 2025 Direction statement refers to a 'biosecurity team of 4.7 million' which is 'a collective effort across the country: every New Zealander becomes a biosecurity risk manager and every business manages their own biosecurity risk'. The government conducts an active program of training and approving the staff of businesses involved in the transport and handling of imported containers and cargo of all kinds, and this yields good biosecurity outcomes. Continued cooperation and comparison of the Australian and New Zealand systems for approving and oversighting industry-based biosecurity risk management services is beneficial and strongly supported.

Chapter 3

Sea vessel entry pathway

3.1 Sea vessel biosecurity risk management

Ships that enter Australian territory from international waters arrive at first points of entry shown in Map 1. At those points, biosecurity officers assess the ships to ensure that biosecurity risks such as hitchhikers and contaminants are identified and treated accordingly.

MAP 1 Australian first points of entry for vessels

Source: Department of Agriculture and Water Resources

All masters of all ships that plan to enter Australia must provide a Pre-Arrival Report to the department no more than 96 hours before arrival.

Each ship commences its voyage into Australia from overseas at a first point of entry. The voyage comprises one or more visits to other Australian ports and continues through to the ship's departure. Each inbound voyage is initially considered high risk until a risk assessment of the vessel has been completed. The assessment is based on its last port of call, its master's past biosecurity compliance history and the information in the Pre-Arrival Report from the vessel's master or agent. Based on this risk assessment, the ship is directed for various types of inspection, treatment and certification services as needed. Inspections may be:

- routine vessel inspections which include the inspection of all galleys, pantries, provision stores and some cabins, management of the vessel's waste facilities, ballast water verification, and any other areas deemed appropriate by the biosecurity officer
- ship sanitation certification to certify that, at the time of inspection, there are no signs of rodent or mosquito vectors or reservoirs and no further measures are required
- seasonal pest inspections for the presence of a seasonal pest on vessels. Seasonal pest risk is assessed based on the vessel's previous ports or pre-arrival information. Four separate inspections are carried out for brown marmorated stink bug, Asian gypsy moth for vessels visiting far-east Russian ports, Asian gypsy moth for other areas, and burnt pine longicorn. For example, the Asian gypsy moth flight season is between January and May each year. Vessels that have visited an overseas port with Asian gypsy moth risk in the target period could be subject to targeted inspection on arrival at the first port
- other inspections include those for international crew changes, waste surveillance, landed goods not considered cargo, livestock carrier vessels, ballast water, human health, coastal strip of all biosecurity risk materials, cruise ship passenger day-trippers, general surveillance, and follow-up and verification of compliance with former directions.

Treatments are ordered to deal with specific problems that have been found. For example, beehives or Asian gypsy moth egg masses may be sprayed and removed; food storage areas may be cleaned thoroughly after rodent droppings have been found; or specific cargo may be fumigated while the vessel remains offshore after brown marmorated stink bugs have been detected. If needed, further inspections are made to determine whether the treatments have been successful.

Non-commercial vessels, such as yachts and super yachts intending to visit Australia, must also report their pending arrival to the department at a designated first point of entry (Map 1). When these vessels arrive, a biosecurity officer physically inspects the vessel, checking the health of people on board, personal effects, timber components, kitchen facilities, store rooms, water containers and the hull. If there are no biosecurity concerns, the vessel and passengers are released. If there are biosecurity concerns, the owner must undertake certain directions or treatments to address the concern. In 2017, 612 non-commercial vessels visited Australia, 739 inspections were conducted with only nine failures. A yacht can undergo several inspections per voyage, including routine vessel, sanitation, coastal strip and crew change.

3.2 Maritime Arrivals Reporting System

Commercial vessels include bulk carriers, cruise vessels, tankers, container vessels and roll-on roll-off (Ro-Ro) cargo. Most vessels that arrive in Australia are commercial vessels. Commercial vessel biosecurity risks are managed through the Maritime Arrivals Reporting System (MARS) —an online web portal that allows the department's biosecurity officers to communicate directly with ship's masters, shipping agents and companies, and other stakeholders.

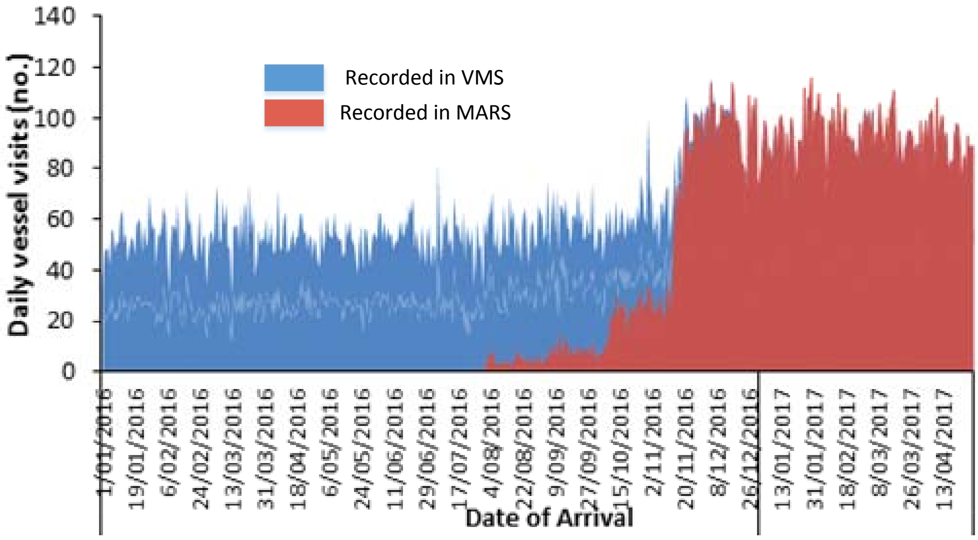
MARS is administered through the Maritime National Coordination Centre (MNCC) in Adelaide. It provides greater transparency for shipping operators, masters and agents about biosecurity requirements and consequences of non-compliance. Users can go online to:

- submit required pre-arrival information about the biosecurity status of a vessel
- request departmental services such as ship sanitation certification
- view risk assessments, directions, inspection findings, certificates and compliance outcomes after the vessel is inspected, as entered online by biosecurity officers, and
- see a summary of charges.

The department fully implemented MARS from 2017 after piloting and extensive user consultation in 2016, replacing the department's Vessel Monitoring System (VMS).

MARS has significantly improved coverage of shipping biosecurity risk management. It has greater data capture capabilities than VMS, which has meant that the number of daily recorded vessel visits monitored jumped significantly as the department transitioned from VMS to MARS (Figure 2). Also, MARS records a vessel's entire itinerary, including all port visits, whereas VMS only recorded a visit to an Australian port if the vessel was inspected.

FIGURE 2 Daily vessel visits recorded from 1 January 2016 to 13 April 2017



Source: Department of Agriculture and Water Resources

MARS uses a **risk engine** to support decisions prioritising assessment and inspection activities. The risk engine gives a final risk score (between 1 and 99) for each vessel visit by considering vessel compliance history, last overseas port of call, master compliance history and information from the pre-arrival report. The initial list of risk factors was developed using historical data and is refined using data from MARS as it matures.

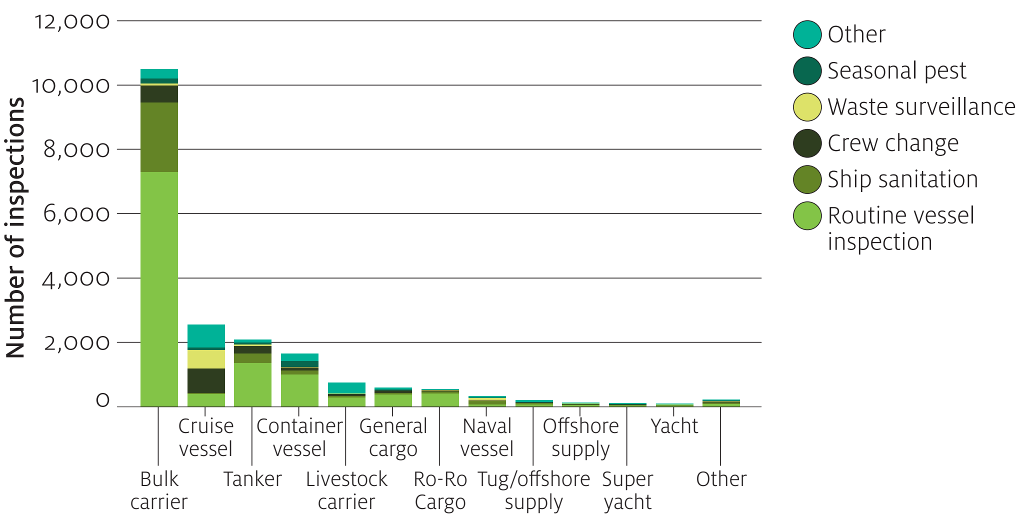
By port, a sequential score is given to each vessel, combining the risk score with a score for each inspection queued. The port arrivals screen within MARS shows vessels sorted by highest priority inspection types and then by highest risk vessel. This enables local supervisors to allocate inspectors more efficiently and effectively to manage the highest-priority risks.

In 2017 a total of 13,408 or 75 per cent of vessel voyages were subject to least one inspection by a biosecurity officer. Routine vessel inspections, ship sanitation certification and crew change inspections accounted for 57, 15.5 and 9.5 per cent of inspections respectively (Figure 3). Questionnaire results from vessels for targeted seasonal pest inspections for Asian gypsy moth and burnt pine longicorn beetle gave 526 positive and 1,613 negative results.

3.3 Vessel Compliance Scheme

The Vessel Compliance Scheme (VCS) uses the MARS risk engine and records to reduce inspection rates (down to 40 per cent of voyages over a defined voyage cycle) of vessels that have made at least three biosecurity-compliant voyages to Australia in the previous 12 months.

FIGURE 3 Ship inspections by vessel and inspection type, July 2016 to December 2017



Source: Department of Agriculture and Water Resources

The department applies demerit actions and associated points for minor, major or critical non-compliance in response to questions on the inspection eForm completed by biosecurity inspection officers. A vessel that incurs more than 10 demerit points at one inspection or 20 or more demerit points over three inspections is disqualified and returns to 100 per cent inspection rate. To qualify for the VCS, vessels must show good compliance over a three-voyage cycle.

Livestock vessels and vessels with a history of recent non-compliance must be inspected at every voyage. Regardless of compliance history, the department may carry out extra targeted inspections based on risk assessments. Key demerit point actions include:

- undeclared hitchhiker animal
- undeclared ship's pet/animal
- mosquito risk
- evidence of rodent infestation
- insect infestation found on board
- evidence of seeds, meal or organic material on deck
- failure to clean decks that results in significant issues
- improper waste management
- ballast water management.

Ballast water compliance is monitored through MARS using an offline Ballast Water Report Form. Vessels must supply information on tank capacities, pump delivery capacities, arrival details and information on ballast water and sediment discharge, exchange and uptake periods. Non-compliant ships receive demerit points and may be removed from the VCS.

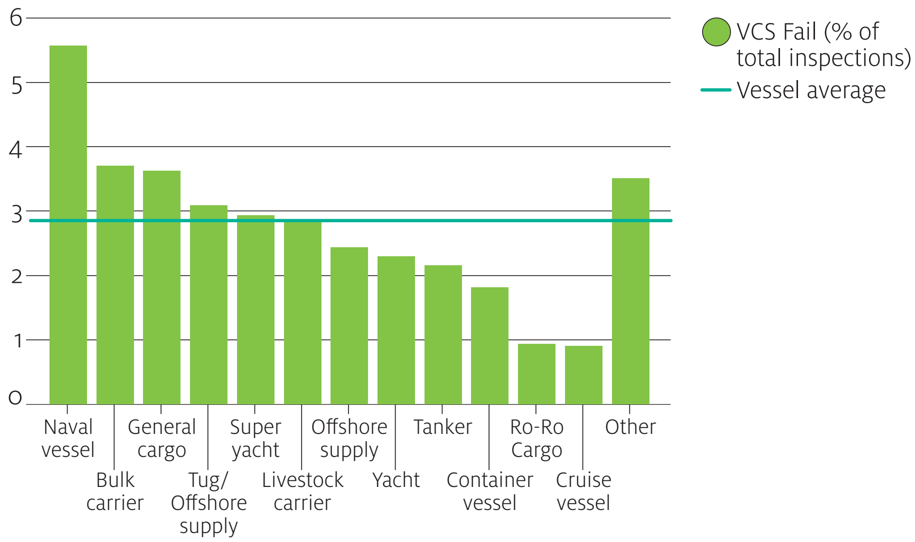
Where a vessel inspection does not meet the department's standards, the biosecurity officer issues additional directions or corrective actions. MARS makes this information available to other biosecurity officers as well as the vessel's captain. Vessels and agents may appeal a demerit decision through the MNCC. No appeals have been lodged to date.

A system of applying inspection debits and credits ensures the need for inspections is balanced and that vessels receive documentary clearances and associated benefits of being on the VCS. For example, if a vessel was due for a documentary clearance but receives a ship sanitation certificate (SSC) inspection instead, the vessel receives a credit. Conversely, if the vessel was due for a routine vessel inspection which was missed, the vessel will receive a debit. Vessels are allowed a maximum of one credit or debit, which will not expire.

The VCS only determines the level of intervention for the vessel. Legal action for non-compliance is carried out separately. Fines for exceeding demerits cannot be given out under the scheme. However, an action of non-compliance could trigger VCS demerit points and contravene the *Biosecurity Act 2015*. For example, if a shipmaster discharged ballast water in a non-compliant way, the vessel would incur 10 demerit points and would immediately be disqualified from the VCS. The department could also pursue the non-compliance under Chapter 5 of the Act, with the associated penalties.

Figure 4 shows the failure rate of different types of vessels on the VCS. There was an overall VCS failure rate of 2.7 per cent of total inspections. Naval vessels (mainly foreign) failed at over twice this rate, and cruise ships failed less than 1 per cent of inspections. The biosecurity risk posed by naval vessels is considered separately in the Inspector-General's review of military biosecurity (Inspector-General of Biosecurity 2018).

FIGURE 4 Vessel compliance scheme fail by ship type, 2017



Source: Department of Agriculture and Water Resources

The VCS aims to give vessel masters and crew a clear indication of the types of risks that biosecurity officers focus on as part of the inspections and the consequences of non-compliance. This ensures that vessel masters and crew are better able to prepare the vessel, improve their chances of qualifying as 'compliant' and take advantage of reduced intervention and associated benefits.

3.4 Improvements to Maritime Arrivals Reporting System

MARS and the VCS are managing shipping biosecurity risks much better than was previously possible, and they have been well received by the shipping industry. More consistent and thorough risk assessments can be undertaken for all vessels before they arrive at Australian ports. Also, the MARS educational material has increased biosecurity awareness among shipping companies and ships' masters, enabling them to better understand and comply with Australian requirements.

While MARS captures data on the last port of embarkation before the vessel sailed to Australia, there is no data on previous ports of call. If high-risk countries or ports have been visited there may be a significant hitchhiker risk depending on the time of year. This risk could be better managed if MARS had the capability to require ships' masters to list up to five prior overseas ports of call when submitting a Pre-Arrival Report.

Initial MARS development focused on communication between persons directly responsible for the ships and the biosecurity staff responsible for arranging and carrying out inspections and oversighting any necessary treatments before clearance of the ship. Provision for higher-level data analysis was given second priority. There is a wealth of data rapidly accumulating in MARS and considerable opportunity for both improved management of operations and better overall risk management. Additional software development is underway to prepare summary reports for decision makers and operational staff at different levels of the department as well as industry in order to maximise the usefulness of the system.

Recommendation 1

The department should modify the MARS software so it can provide:

- ability for ships' masters to list up to five prior overseas ports of call when submitting a Pre-Arrival Report,
- real-time reporting and visualisation of MARS inspection data and missed inspections, including reasons by port and ship type, for all biosecurity officers and managers, and
- better summary reports for departmental decision-makers and operational staff, and industry, to facilitate timely and targeted risk management.

Department's response: Agreed.

The above recommended modifications have been prioritised for future MARS releases.

Chapter 4

Sea container entry pathway

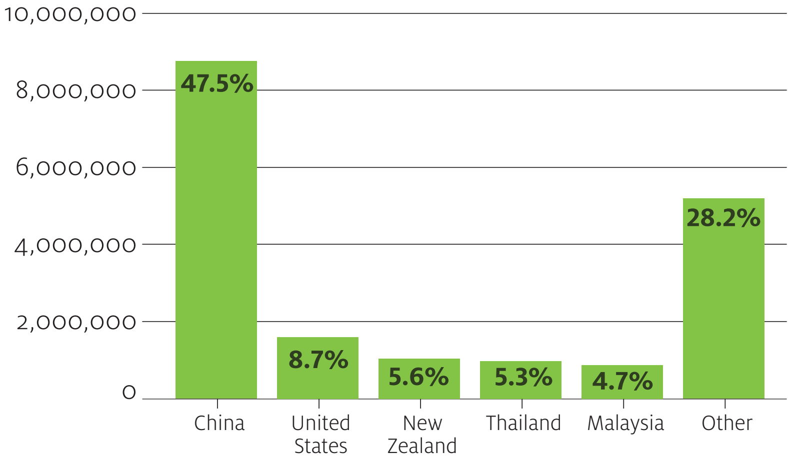
4.1 Sea container arrivals

On average, a sea container lasts for about 18 years and is used for four to five trips per year. Each container passes through about 13 ports annually. In 2015 there was a worldwide annual throughput of about 679 million 20-foot equivalent units (TEU) (Brokerhoff et al. 2016).

The number of containerised freight imports to Australia has grown significantly over the past 10 years. In 2016–17 there were over three million containerised freight imports. In 2014 the number was forecast to grow at an average rate of 5.1 per cent for the next 20 years, so that the number of imported containers would reach 9.8 million TEU in 2032–33 compared with 2.5 million TEU in 2012–13 (BITRE 2014).

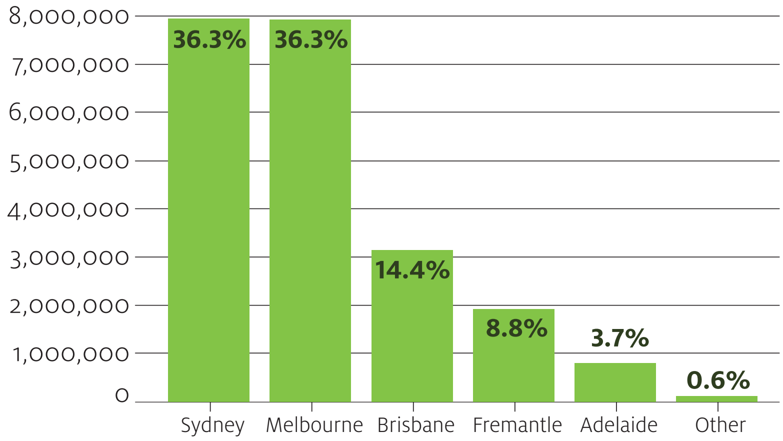
From 2010 to 2017 over 21 million containers arrived in Australia, almost half from China (Figure 5). Sydney and Melbourne received over 72 per cent of container arrivals (Figure 6).

FIGURE 5 Top five countries of origin for container arrivals, 2010–2017



Source: Department of Home Affairs

FIGURE 6 Top five ports of discharge for shipping containers, 2010–2017



Source: Department of Home Affairs

4.2 Sea container risk management policy, 2010–2018

4.2.1 Phasing in a risk-based policy

Until 2009 all containers were supposed to be inspected at the wharf gate before leaving the port in order to detect obvious external soil contamination or hitchhikers such as giant African snails. For wharf-gate inspection, a truck carrying a container stops at the exit of a wharf or terminal, and an inspector walks around the truck examining the areas of three or four sides (back, front, driver's side and, when possible, the bottom) of the container that are visible without unloading the truck. This takes about three to five minutes per container.

Beale et al. (2008) recommended a move away from mandatory inspection of all containers since 98 per cent of containers passed inspection.

In 2010 the department formulated the Sea Container Risk Management Policy (SCRMP) to detect and manage biosecurity risk material on the outside and inside of sea containers entering Australia. It introduced a targeted risk-based approach, with external risks being managed by more intensive inspection of all containers coming from 'high-risk' countries (known as country action list (CAL) countries) and a lower intensity and rate of routine wharf-gate inspection of other containers (Figure 7). The SCRMP had two phases:

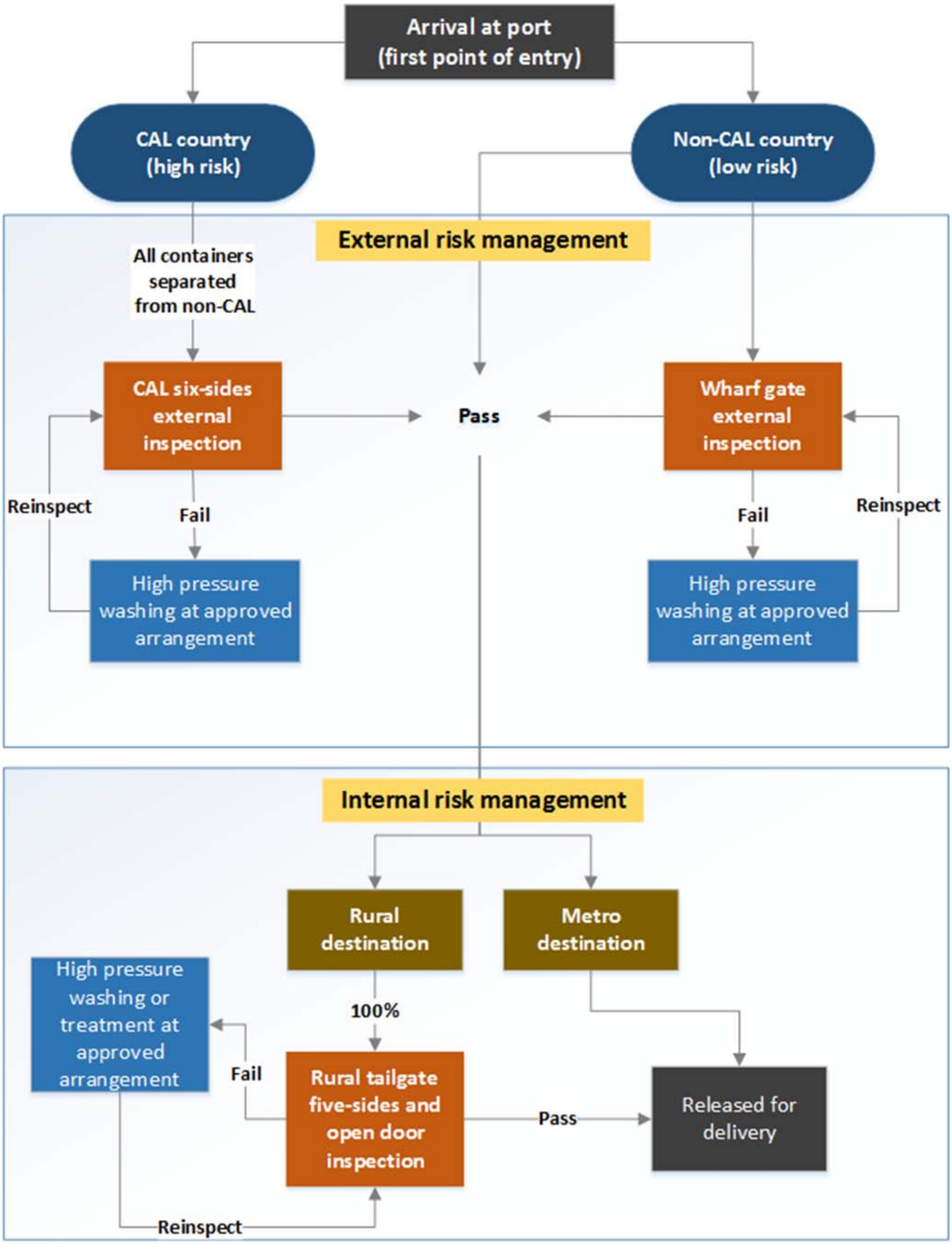
In Phase 1, government inspections and surveillance were to be undertaken, including:

- six-sided inspection on the wharf of all containers arriving from a CAL country
- wharf-gate inspection of 30 per cent of all other containers
- rural tailgate inspection of all containers moving to a rural postcode
- rural transit inspection of all containers being moved by rail, or a voluntary proportion of containers being moved by road, between major metropolitan areas
- surveillance of empty containers at container parks, including targeted inspections of containers leaving the wharf (stack run outs) to container parks.

In Phase 2, risk pathways were to be better targeted by expanding offshore and onshore industry partnership arrangements, which would allow:

- reducing the proportion of routine wharf-gate inspections on a risk basis
- modifying the handling of containers moving through or to a rural destination by:
  - inspecting only containers not destined for an approved arrangement site
  - a more targeted approach to containers moving by rail and road
- possible surveillance and third-party industry arrangements for external inspections, including a revised approach based on the analysis of available data.

FIGURE 7 Sea container external and internal risk management

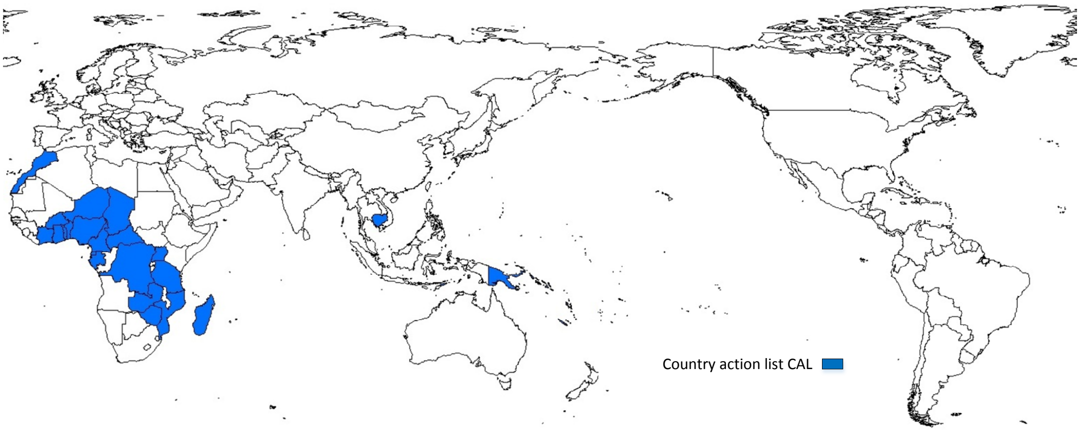


Source: Department of Agriculture and Water Resources

4.2.2 High-risk source countries

In 2010 the **Country Action List (CAL)** defined the 43 countries deemed to pose the highest biosecurity risk due to the presence of giant African snails in those countries (Map 2). Sea containers (and non-containerised (break-bulk) cargo) loaded in CAL countries were considered to be at higher risk of external contamination than containers from other destinations. Therefore, they were subjected to additional intervention and screening when unloaded in Australia. Measures were devised mainly to target giant African snails, with the assumption that this would largely manage other external contamination risks as well.

MAP 2 Country action list (CAL) countries



Source: Department of Agriculture and Water Resources

CAL container segregation on wharf—CAL containers offloaded from a vessel are stored together on the wharf in a segregated area until every CAL container has been offloaded. They are then presented for inspection as a group. Inspection may occur up to a few days after the containers are offloaded depending on volumes to be inspected, the availability of biosecurity officers and the presentation of the containers by stevedores. For example, containers offloaded on weekends would usually be inspected on a subsequent weekday and, if the number of profiled containers is large, it may take more than one day to inspect them all.

CAL containers awaiting inspection must be surrounded by a ring of salt or snail baits to prevent snails from moving to other areas of the wharf or beyond (Figure 8). Salt or bait rings must be monitored before the inspection to ensure that they remain intact (rain, wind or vehicles may compromise salt rings and large infestations of snails may exhaust baits).

Six-sided inspection for CAL containers—Each container is placed on a stand with a ladder, enabling a biosecurity officer to inspect its top, bottom and four vertical sides. Inspectors pay particular attention to nooks and crevices where small insects and contamination could lodge—for example, forklift tine holes, top and bottom locking holes, reinforcing ribs and ledges, door seal areas, and cables and reefer motor areas. A six-sided inspection takes about 10 minutes. Hourly throughput depends on local handling arrangements for the containers and how fast stevedores can present them for inspection.

After the container has been inspected, it is either released or treated to address any risks found. Inspection outcomes are recorded and reported to the Cargo National Coordination Centre, which can lift the electronic hold in the Integrated Cargo System (ICS). The container can then be removed from the wharf.

Empty CAL containers may be inspected internally at the wharf by a biosecurity officer or by department-accredited employees at a class 2.6 approved arrangement site (empty shipping container parks).

FIGURE 8 Ring-salting around segregated CAL containers awaiting inspection

Source: Department of Agriculture and Water Resources

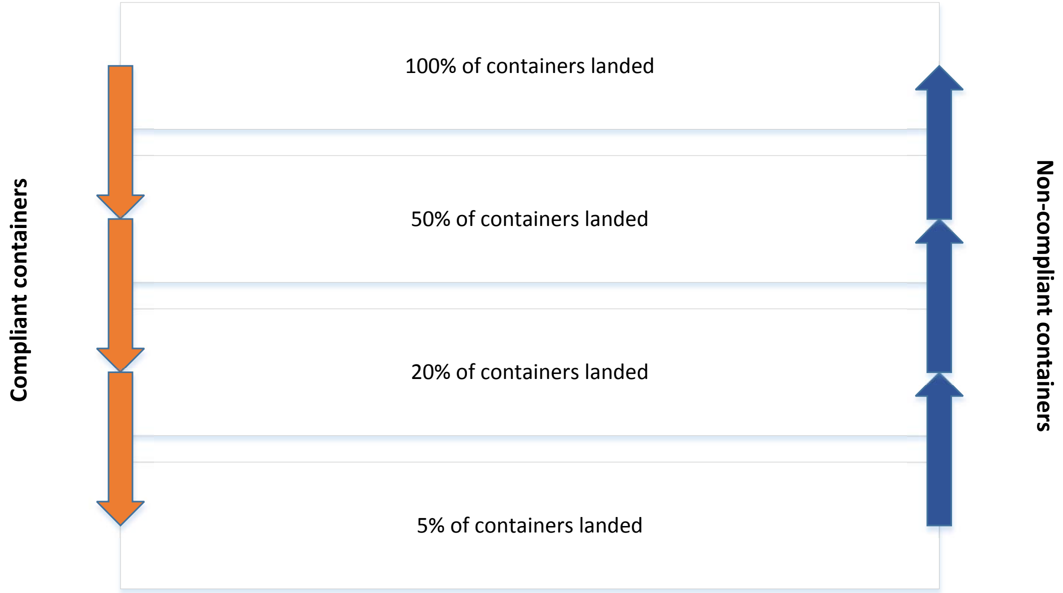
4.2.3 Sea Container Hygiene System

The offshore **Sea Container Hygiene System (SCHS)** manages biosecurity risks of sea containers from high-risk ports of loading. SCHS was developed by New Zealand in 2006 and implemented by Australia in 2010.

Shipping lines or port authorities wishing to participate must design and implement an offshore process to ensure that containers are cleaned externally and internally, treated externally with insecticide for pests and stored in a designated storage area at the port of loading. By managing hitchhiker and contamination risks offshore, industry participants can ensure reduced rates of inspection on arrival, and Australian and New Zealand authorities can have enhanced confidence that high biosecurity risks are minimised.

Figure 9 shows how compliance with SCHS leads to lower rates of inspection. When a participant first enters the scheme, all containers receive on-arrival inspection. Three-monthly reviews are then carried out, and inspection rates may be reduced in three stages down to 5 per cent. If there is any non-compliance, the inspection rate is increased to the next level. If mobile pests (ants or snails) are detected, the inspection rate is immediately increased to 100 per cent for one month. Any serious or ongoing failure to meet scheme requirements may cause indefinite suspension.

FIGURE 9 Compliance-based intervention in the Sea Container Hygiene System

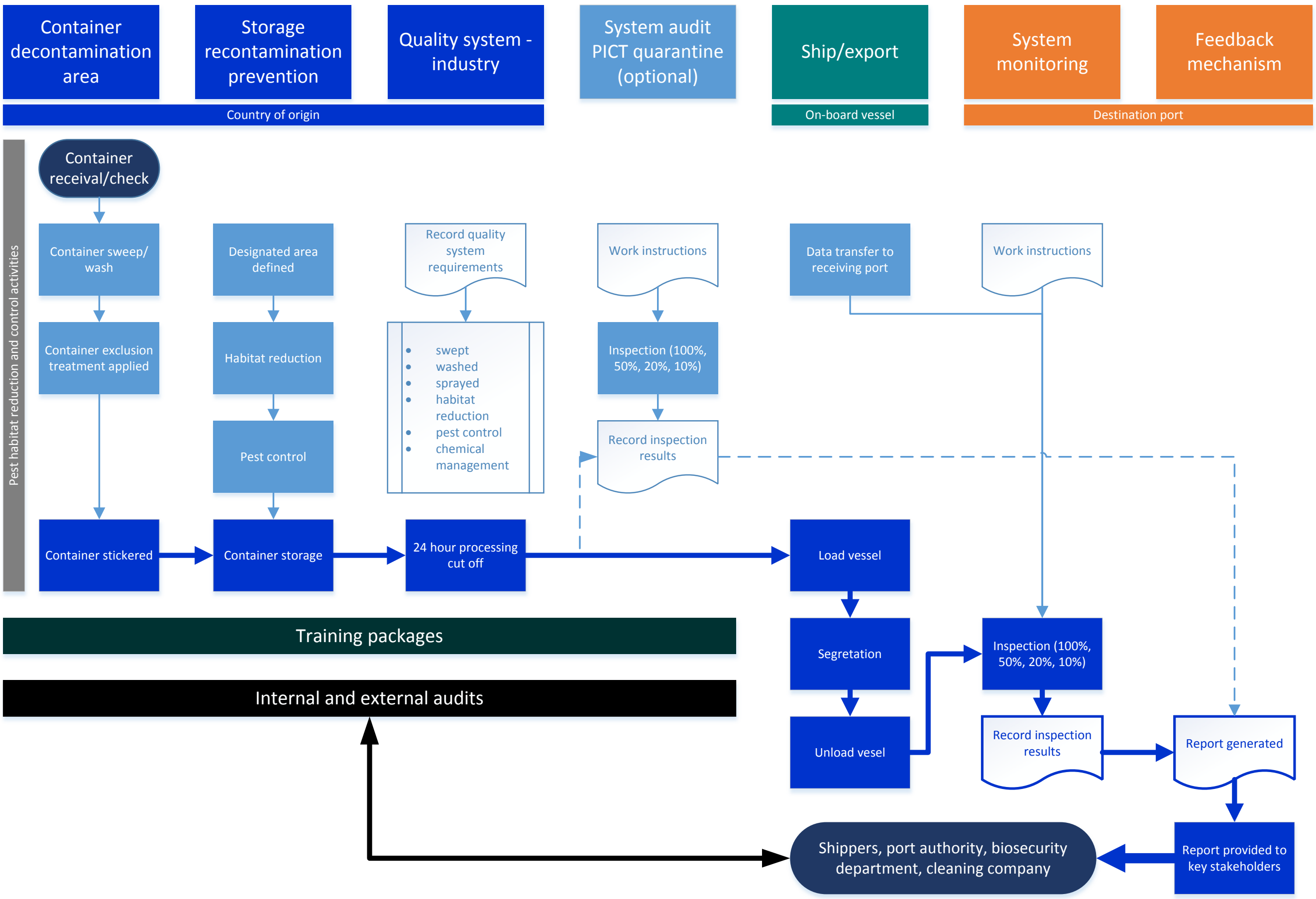


Source: Department of Agriculture and Water Resources

SCHS normally operates through voluntary agreements with individual shipping lines or port authorities rather than between governments. However, Australia has also formalised a memorandum of understanding with the Mauritian national plant protection organisation to provide certification of exported containers.

SCHS operates in a subset of CAL ports in the Pacific. There are approved facilities in Papua New Guinea (Port Moresby and Lae), the Solomon Islands (Honiara) and Samoa (Apia). Australia has accredited specific ports in Papua New Guinea and the Solomon Islands and a participating shipping line—Swire Shipping. New Zealand focuses on Samoa and Tonga. In 2016 both countries collaborated to approve two facilities at the Fijian Port of Suva from April 2018. Vanuatu and New Caledonia are also under consideration. Figure 10 provides an overview of SCHS.

FIGURE 10 Sea Container Hygiene System overview



Source: Department of Agriculture and Water Resources

4.2.4 External container inspection results

Between 2014 and 2017 10.7 per cent of the 11.3 million containers imported into Australia were inspected. Contamination was found on 1.9 per cent of those inspected (Table 4).

High external risk (CAL) container inspection results—Between 2009–10 and 2016–17 Australia received containers from 38 of the 43 CAL countries and the department conducted 381,828 CAL inspections. Of these, about 20 per cent were non-compliant. Table 5 shows that the overall failure rate of inspections from CAL countries halved between 2009–10 and 2016–17, mostly due to less low-level contamination.

In 2015–16, 43 per cent of all CAL containers entering Australia had been treated in SCHS facilities in Papua New Guinea and the Solomon Islands. Due to SCHS compliance, 37 per cent of these were exempted from full CAL inspection levels. This treatment is likely to have contributed to the improved performance found by CAL container inspection on arrival by 2017.

TABLE 4 Types of contamination incidents from all container inspections, 2014–2017

Contaminant	Frequency (%)
Soil only	76.4
Plant material only	6.9
Soil and plant material	6.5
Seeds only	3.6
Snails only	1.3
Insects only	1.1
Animal material only	0.7
Other (including multiple)	3.5

Source: Department of Agriculture and Water Resources

TABLE 5 Inspection outcomes for country action list containers, 2009–10 to 2016–17

Outcome	2009–10 (%)	2010–11 (%)	2011–12 (%)	2012–13 (%)	2013–14 (%)	2014–15 (%)	2015–16 (%)	2016–17 (%)
Overall failure rate	25.9	21.5	21.8	24.6	22.1	18.2	13.8	12.8
High-level contamination	14.9	12.2	15.8	22.2	20.7	16.9	12.3	11.6
Low-level contamination	11.0	9.4	6.0	2.4	1.4	1.3	1.5	1.2

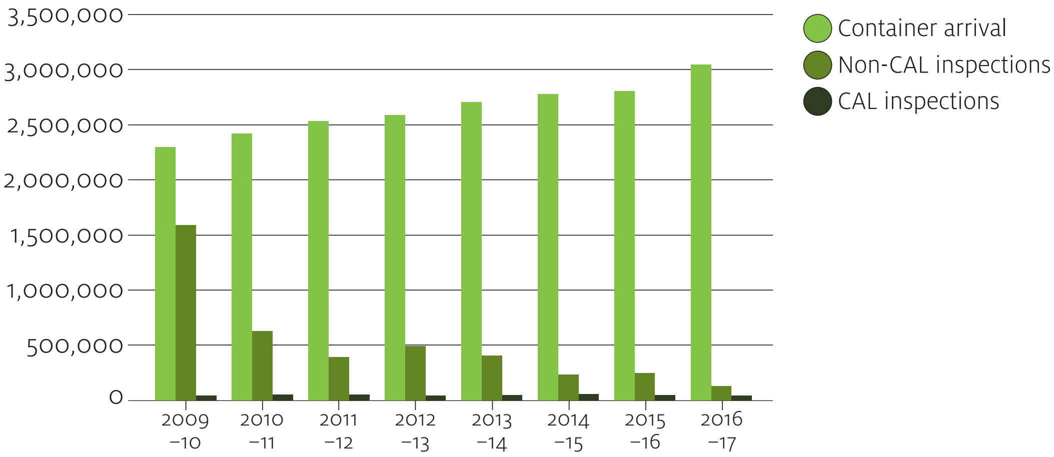
Source: Department of Agriculture and Water Resources

Low external risk (non-CAL) container wharf-gate inspection rates—The SCRMP specified in 2010 that 30 per cent of non-CAL containers should be subject to a less intensive wharf-gate inspection, although this rate might be reduced over time based on assessed risk. However, wharf-gate inspections progressively declined from 26 per cent of non-CAL containers in 2010–11 down to only 4.3 per cent in 2016–17, while container arrivals increased steadily (Figure 11). This appears to have been largely due to resource constraints, including the need to redirect resources to emergency responses. Between 2009 and 2017, inspection of CAL containers remained steady at approximately 47,700 per year.

Notably, in 2015–16, of 8.9 per cent of about 2.7 million imported containers that were externally inspected, 0.7 per cent were found to have high-level contamination. It is likely that, of the 5.7 million containers released uninspected in 2015–16 and 2016–17, there were about 42,000 highly contaminated containers.

It appears that, while 100 per cent of CAL container and rural tailgate inspections were continued, the substantial reductions in wharf-gate inspections resulted purely from ad hoc availability (or lack) of inspection resources, not from risk profiling. Likewise, it appears that the intended ‘rural transit’ external inspections of containers being carried by rail or road through rural areas were never implemented because of difficulties in profiling them (and also resource constraints). This has led to an increasing and unmitigated potential biosecurity risk from externally contaminated containers.

FIGURE 11 Sea container arrivals and inspection numbers, 2009–10 to 2016–17



Source: Department of Agriculture and Water Resources

4.2.5 Washing externally contaminated containers

Biosecurity officers must actively redirect contaminated containers, or containers with obscured but potentially contaminated bases (such as those on flat beds), to container stands at the wharf or, more usually, to be trucked to off-wharf approved arrangement site(s) for washing. When over two millimetres in depth of soil contamination or other biosecurity risk material is found on the outside of the container, it must be washed with high-pressure hosing.

Containers that are to be washed are stacked separately before being moved one by one onto a stand on a washing bay. Manual washing takes around 15 to 20 minutes per container. After washing, a biosecurity officer re-inspects each container (on six sides). This considerably slows the delivery and transport process and incurs extra inspection, delivery and transport costs of $200 to $300 per container.

Effluent water from the washing bay may be filtered before it is discharged to the municipal sewer, collected into a tank and treated with hypochlorite or collected and transported offsite for discharge to the sewer under an appropriate approved arrangement with the department. Residues from the washing bay, soil trap or filter must be disposed of as biosecurity waste.

4.2.6 Internal container cleanliness inspections and treatment

As set out in Table 3, each container has a unique identifier that should be linked to a cleanliness statement and packaging declarations. Full container load (FCL) consignments may be delivered direct to the importer if they have no other biosecurity risks. Less-than-full container load (LCL) consignments (and also unaccompanied personal effects) can only be deconsolidated at an approved arrangement site, where any contamination risk can be addressed. Empty containers are inspected at container parks by approved staff.

Containers destined for rural areas (identified by postcode) are considered a high biosecurity risk because, if those containers are contaminated, there is a potential for exotic pests and diseases to be introduced directly into agricultural areas, where they are more likely to establish. Therefore, all containers that are to be unpacked in rural areas are given a **rural tailgate inspection** for biosecurity risk material (Figure 12). A truck carrying a targeted container backs up to an approved stand (if available), allowing the biosecurity inspector to supervise the breaking of the seal. The inspector then inspects the back of the inside area and visible contents (without unpacking) and checks for cleanliness and compliance of the contents and packaging. The inspector pays special attention to crevices and junctions between the floor, walls and doors. If any hitchhikers (dead or alive) are found, the container is held in quarantine and unpacked for further inspection while specimens are sent for identification. When specific pests requiring fumigation are found, the container is directed to an approved fumigator. Methyl bromide is the most commonly used fumigant.

From 2012–13 to 2016–17, 264,968 rural tailgate inspections were conducted and 12.4 per cent were non-compliant. In 2015–16, 15.6 per cent were non-compliant, possibly indicating a trend of increasing internal contamination in all containers.

FIGURE 12 Biosecurity officers carrying out external and tailgate inspections

Source: Department of Agriculture and Water Resources

4.3 Future sea container biosecurity risk management

4.3.1 Proposed new Integrated Risk and Compliance Model policy

The integrated risk and compliance model (IRCM) is a new policy for sea container external risk management. It is being developed to target inspections and interventions for sea containers more precisely by classifying these containers as high, medium or low risk, depending on past history, and then redistributing workload accordingly. The IRCM will also provide opportunities for industry to manage risk offshore and onshore for low-risk containers through approved arrangement sites. The IRCM will replace the CAL classification for containers.

High, medium or low external risk—The IRCM will consider historical detections of snails, contamination and insects and whether these have been found from inspecting less or more than 50 containers per year at both the port and country level. It will then give each container a high, medium, or low external risk profile based on its last country or port of origin. The rates, types and location of interventions for containers destined for metropolitan or rural areas, or transiting through rural areas, will be decided through their external risk profiles.

For metropolitan destinations and rural transit, 100 per cent of high external risk containers will have intensive on-wharf six-sided inspections unless they were managed through approved offshore hygiene arrangements such as SCHS. Fifty per cent of medium-risk containers will have six-sided inspections, and only 5 per cent of low-risk containers will have inspections at the wharf gate or an approved arrangement site.

Modelling shows that, if the IRCM had been in place in 2014–15, when 11 per cent of non-CAL containers received a wharf-gate inspection, an extra 26,000 six-sided inspections and 100,000 fewer three- to four-sided wharf-gate inspections would have been carried out. An extra 60 per cent of high-level contamination would have been detected, and departmental inspection costs would have been reduced by 8 per cent. As long as the external risk profiling is robust, the new IRCM should markedly improve on the current system by increasing the detection of contamination. However, as the rate of wharf-gate inspections is currently below 5 per cent, further departmental savings seem unlikely.

For rural destinations, containers will be classified as high or low risk based on both external risk profiles and historical internal inspection non-compliance data. Low-risk containers may be inspected by approved persons at approved facilities (potentially halving the inspection burden for biosecurity inspectors and reducing the cost to industry). Biosecurity officers will continue to inspect high-risk containers at wharves or approved facilities.

4.3.2 S-Cargo enhancement project

The department is currently working to upgrade its S-Cargo software system, to move from the SCRMP to the IRCM and make it more operationally efficient. S-Cargo was launched in 2011 to allow the department to interface with ICS and manage the holding, inspection and treatment records and release of CAL containers, which make up 2.5 per cent of all containers imported annually. However, the current version of S-Cargo does not address non-CAL sea containers or break-bulk cargo.

S-Cargo improvement will allow the department to apply a risk-based approach to all sea containers and some break-bulk cargo, make biosecurity decisions in real time and apply reduced intervention rates for compliant behaviour. It is also hoped that the enhancement will improve data consistency and accuracy, prevent bypasses and reduce clearance times. However, until the enhanced version of S-Cargo is implemented, the projected reduction in biosecurity risks expected by IRCM implementation cannot be realised.

For example, currently the only reason for holding containers given to ICS by S-Cargo is for giant African snails, which then leads to directions to industry to apply salt rings and/or snail baits to all high external risk containers or break-bulk cargo. When other hold reasons can be applied, more appropriate interventions may be prescribed to manage different risks.

Containers from CAL countries destined for rural postcodes also require rural tailgate inspections at the wharf or an approved arrangement site. S-Cargo could be enhanced to reduce the duplication of separate CAL and rural tailgate inspections. Unfortunately, this enhancement is out of scope for the S-Cargo enhancement project without further funding.

Recommendation 2

The department should expedite the upgrading of the S-Cargo software system so it can better manage container and cargo contamination risks, including rural tailgate container inspections.

Department's response: Agreed.

The department is progressing the enhancements to the S-Cargo software system as a priority. These enhancements will strengthen the department's ability to manage the biosecurity risks entering Australia on the surfaces of sea containers and breakbulk cargo. However, the department's ability to better manage container risks is also reliant on the progression of profile changes in the Integrated Cargo System (ICS). As rural tailgate inspections cannot be managed through the S-Cargo system, the department is considering enhancements to the Agriculture Import Management Systems (AIMS) to implement reforms to rural tailgate inspections. In addition, the department is developing a mobile tailgate application for inspectors to capture inspection results.

4.3.3 Expanding the Sea Container Hygiene System

Management of risks offshore gives the highest level of protection to Australia. The department is actively pursuing opportunities to expand SCHS to other ports and countries. Based on the level of interest, it is estimated that a further six Pacific countries might adopt SCHS over the next 10 years. However, this depends on: the availability of departmental staff to negotiate such expansion of the SCHS with all relevant parties; industry take-up; and the ability of S-Cargo to handle the new data. In initial informal discussions, our major trading partners China and the US have also each expressed some interest in SCHS.

Recommendation 3

The department should prioritise allocating resources to expand the Sea Container Hygiene System, to enable better offshore management of sea container biosecurity risks from more countries and ports.

Department's response: Agreed.

The department will ensure adequate resources are allocated to prioritise expansion of the Sea Container Hygiene System (SCHS) to more countries and ports. However, the uptake of SCHS is dependent on the level of interest shown by industry and overseas government agencies.

4.3.4 Rethinking sea container inspection and washing

Container inspection and cleaning will need to be more automated. The number of sea containers entering Australia has been rising steadily, and this is projected to continue. The cumbersome current inspection and cleaning regimes will not be able to cope with these expected volumes and the development of ever-faster cargo transport systems. New automated methods of container inspection and cleaning could improve the efficiency and effectiveness of the whole system. Industry and government should pursue this as a priority.

Improving inspection efficiency—External inspections of containers by biosecurity officers are difficult, tedious and time consuming and must be carried out in all weather. This has work health and safety impacts on biosecurity officers. Also, even with intensive inspection of crevices where small insect pests may hide, some may be missed. Wharf-gate inspections are far less efficient and are only likely to detect gross soil contamination or large pests such as giant African snails. Ants and other small pests can remain hidden on the underside or in crevices.

There is an increase in automated container handling at major ports, especially Sydney, Melbourne and Brisbane. Movement of containers within some wharf precincts at Sydney and Brisbane is now done by robots, all controlled from Sydney.

Automated solutions for more efficient and effective external container inspection are being researched at present, but none are yet available. The department has commissioned CSIRO to investigate automated options to detect external contamination—for example, surveillance cameras could be attached to drones or to the robots that currently move containers around wharves at larger ports.

Reducing stockpiling of high-risk containers at wharves—Stevedores may stockpile potentially contaminated containers on the wharf until it is practical or operationally efficient to present them for inspection. By surrounding these containers with a ring of salt, snails and slugs may be effectively prevented from leaving the area. However, this may not be effective against other pests, such as ants. Therefore, there is a risk that external hitchhiker pests can escape to nearby environments. For example, in 2014 a red imported fire ant nest was found on a public road verge in Sydney just outside the high-risk container holding area of Port Botany. This illustrates a previous failure to manage this risk, and it could well happen again. Therefore, the practice of stockpiling containers for any length of time before inspection should be minimised.

Automating container cleaning—Externally contaminated containers found at major ports are normally referred to approved facilities near major ports for washing and re-inspection. These facilities are already crowded and busy. They will be put under extreme pressure if there is a major increase in the number of contaminated containers that are detected, as projected in the IRCM modelling. From a biosecurity risk management perspective, it would be highly desirable to install automated high-pressure container cleaning facilities so that high- and medium-risk containers could be cleaned before leaving the wharf precincts at these ports.

AWH Pty Ltd implemented a functioning sea container washing system at Fremantle Port. The washing unit used recycled water to clean all six sides of a 20-foot shipping container in only five minutes (Figure 13) including loading off and on the truck (AWH 2009). It was proven to operate effectively 24/7, was highly efficient at removing biosecurity risk material and resulted in a reduced work health and safety risk. The unit functioned effectively for six years before being decommissioned due to a reduction in demand.

A separate attempt was made to develop an automated container washer at Brisbane Port, but the unit is not as advanced as the one that was installed at Fremantle Port. This clearly shows that the industry has been looking for a better system to clean containers externally.

If efficient automatic container cleaning facilities were installed at major container receival ports, the whole regime of external risk management of containers could be substantially reformed. High- and medium-risk containers could be washed within a short time of being offloaded from the ship, during the day or at night, to achieve a level of cleanliness which does not require subsequent routine inspection. This would greatly increase their speed of movement from ports. The department could reduce inspection levels and focus on auditing or verifying that all risk-profiled containers were being cleaned appropriately.

The projected development of more infrastructure linking ports by rail seamlessly to intermodal transport hubs, especially in Sydney and Melbourne, will greatly increase the risks of uninspected externally contaminated containers being moved widely across and beyond urban areas. The department and industry should actively explore opportunities for incorporating automatic container washing systems before or during rail transport.

FIGURE 13 Automated sea container washing facility

Source: AWH Pty Ltd

Recommendation 4

The department should require major sea container receival operators to clean high and medium external risk containers to an acceptable standard before they are transported from the port, removing the need for most on-wharf six-sided inspections and subsequent manual cleaning when biosecurity risk material is found. Automated cleaning facilities should also be built into rail infrastructure installed to transport containers to intermodal hubs so that all containers being transported by rail are cleaned before leaving the port, while low risk containers leaving by truck continue to be subject to risk-based wharf gate inspections.

Department's response: Agreed in principle.

The department notes the role of automated methods of container cleaning in risk management of sea containers. However, introduction of automated cleaning facilities could conflict with the promotion and expansion of offshore management options (recommendation 3 refers). Further, the effectiveness of these facilities in managing hitchhiker pests and molluscs needs to be assessed. In light of this recommendation, the department, in consultation with industry, will assess the impact of the introduction of these facilities on efficiency of container management at ports and whether mandating a specific technology solution is warranted. The department will consult with industry as part of this assessment.

Chapter 5

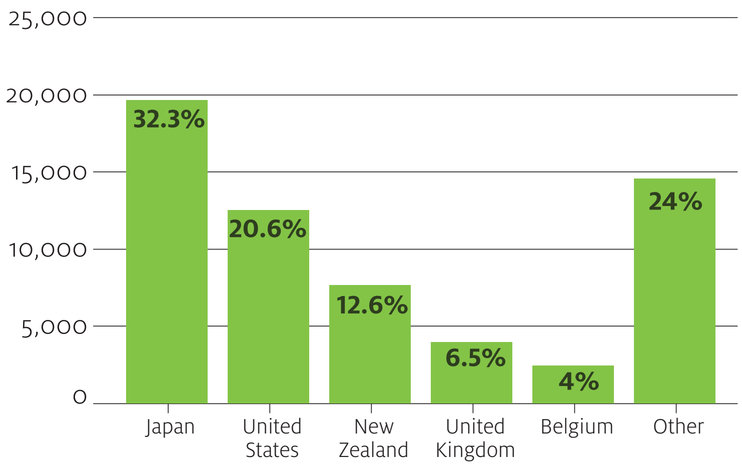
Break-bulk cargo and bulk cargo ships' holds entry pathways

5.1 Break-bulk cargo entry patterns

A vast array of non-containerised 'break-bulk' cargo arrives in Australia. It may be packed into units such as pallets, bags, strapped bundles, drums and crates, or other general cargo such as cars and machinery (new and used), tyres and timber.

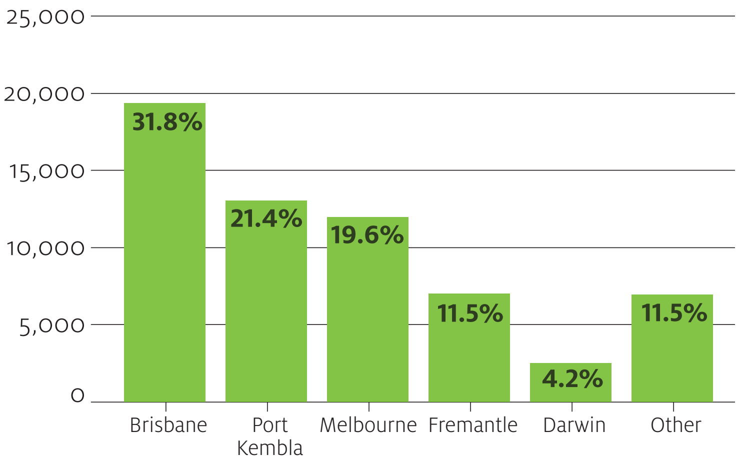
From 2011 to 2017 Australia received over 385,000 break-bulk consignments from 120 countries. About 76 per cent came from Japan, the US, New Zealand, United Kingdom and Belgium (Figure 14). Almost 90 per cent of consignments arrived at five ports (Figure 15).

FIGURE 14 Top five countries of origin, break-bulk consignments, 2011–2017



Source: Department of Agriculture and Water Resources

FIGURE 15 Top five ports of discharge, break-bulk consignments, 2011–2017



Source: Department of Agriculture and Water Resources

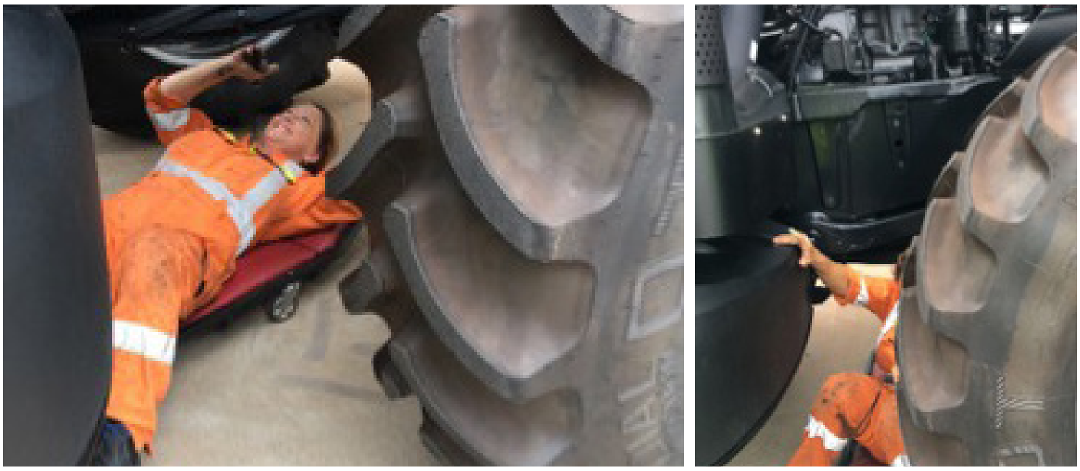
5.2 Break-bulk cargo biosecurity risk management

The management process for break-bulk cargo biosecurity risks is similar in many ways to the process for managing the external risks of sea containers. However, due to its exposed nature, break-bulk cargo poses particular risks of external and internal contamination, which must be addressed on a case-by-case basis. These risks increase as the complexity of the surface and total surface area increase, because there is a greater chance that a hitchhiker pest or contaminant may be hidden and overlooked.

To ensure that any biosecurity risks are identified and managed, break-bulk cargo must be inspected before leaving the wharf if it comes from a high-risk CAL country or is assessed as a high-risk pathway—for example, used farm machinery or vehicles. During inspection the biosecurity officer will visually verify that the cargo is free of giant African snails; seasonal pests; other insects, including ants and bees; and biosecurity risk material, including soil, seeds and plant or animal materials (Figure 16).

Cargo may be released to the importer after inspection at the wharf if no other biosecurity risk exists. Cargo that is too complex or large to thoroughly inspect at the wharf may be directed to a class 1.1 approved arrangement site (sea and air freight depot-unrestricted). However, before it is moved from the wharf, the inspecting officer must ensure that it is enveloped in a tarpaulin ('envelope tarping') to prevent any pest or contamination from escaping during transport.

FIGURE 16 Biosecurity officer inspecting an imported new tractor



Source: Department of Agriculture and Water Resources

If the cargo fails inspection, measures will be taken to ensure that, before treatment, the pest does not present a threat. For example, a ring of salt may be placed around suspected vehicles for snails (Figure 17), doors may be sealed or a vehicle may be contained in a quarantine area.

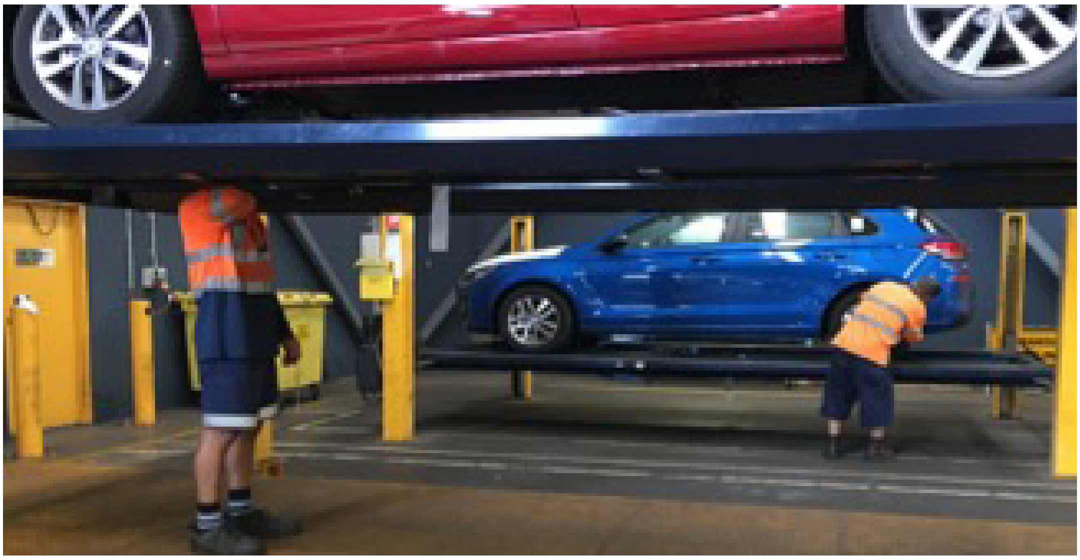
Used cars and large machinery are at special risk of carrying hitchhikers or contaminants. They are therefore subject to 100 per cent inspection. More thorough inspections may detect hidden risks. However, the large inspection area, significant quantity of inspections and consequently limited time available per item increase the risk that biosecurity officers may overlook a hitchhiker or contaminant.

FIGURE 17 Ring-salting around a used car before treatment

Source: Department of Agriculture and Water Resources

New cars and tractors may also be heavily contaminated with seeds that blew onto them while they awaited export to Australia. Five per cent of each shipment of new cars is inspected unless two contaminated vehicles are discovered. If two contaminated vehicles are discovered, the inspection level is increased to 20 per cent (Figure 18). If a further two contaminated vehicles are found, the whole consignment will require detailed inspection, cleaning to remove any visible seeds and then re-inspection. The importer/manufacturer may elect to have the whole consignment cleaned at any stage before re-inspection. This process continues until the biosecurity officer is satisfied the cargo is not carrying any further risk material. If any insects are detected, they are sent for identification by the department's entomologists while the cargo is held. If regulated pests are identified, the cargo may need fumigation or other special treatment.

FIGURE 18 Biosecurity officers inspecting new cars for contamination



Source: Department of Agriculture and Water Resources

The department has developed offshore inspection and cleaning arrangements, especially for companies producing new cars from Thailand and shipping used cars from Japan. These arrangements have greatly reduced the inspection failure rates of some car consignments on arrival. These companies have sent staff to observe and work alongside Australian biosecurity officers so that they can implement required biosecurity risk management measures pre-border. This scheme is currently being expanded to cover new cars from Japan and South Korea.

During December 2017 over 36,000 new cars arrived at Port Kembla. Of these, 3,800 were inspected. This is a rapid turnover considering the capacity of the wharf is 12,000 cars. During peak periods, some low-risk vehicles slated for inspection were missed due to resourcing constraints. From 2011–12 to 2016–17, Port Kembla recorded the most non-compliant inspections (4,821) of all discharging ports.

Table 6 shows that, from 2011–12 to 2016–17, there were 60,855 break-bulk cargo consignments. Of these, 65 per cent were inspected, 46 per cent were non-compliant, almost 39 per cent needing cleaning and 0.5 per cent needing total fumigation.

TABLE 6 Break-bulk cargo summary, 2011–12 to 2016–17

Particulars	Entries	Total consignment count (%)	Percentage of total inspections (%)
Break-bulk consignments	60,855	na	na
Break-bulk inspections	39,865	65.5	na
Break-bulk inspections not passed	18,514	30.4	46.4
Required cleaning	15,490	25.4	38.9
Fumigated—GAS rate	29	0.1	0.1
Fumigated—other rate	251	0.4	0.6

Note: GAS (Giant African snail) fumigation rate is 10 times higher than other rates.
Source: Department of Agriculture and Water Resources

Ten per cent of those needing fumigation required a high rate of fumigation for giant African snails (128 grams per cubic metre at 21°C for 24 hours). The rest required a lower rate (32 grams per cubic metre at 21°C for 24 hours) to kill the pests detected.

The department depends on methyl bromide for much biosecurity fumigation. Under the Montreal Protocol on Substances that Deplete the Ozone Layer, methyl bromide was scheduled to be phased out from January 2005. However, 'critical use exemptions', notably for quarantine, were allowed. Some countries have already stopped using methyl bromide—the European Union banned it for all uses in March 2010. Australia's consumption of methyl bromide dropped from over 200 tonnes in 2004 to 32 tonnes in 2013, and it is trialling alternatives such as sulphuryl fluoride. Unfortunately, sulphuryl fluoride is a dangerous greenhouse gas. It is 4,800 times more potent than carbon dioxide and has a 37-year atmospheric lifespan (Weiss & Prinn 2011).

Chevron Australia and Plant Biosecurity Cooperative Research Centre have successfully undertaken research projects to investigate use of ethyl formate with nitrogen as fumigation treatment for container disinfestation. Results indicated that ethyl formate was effective in killing surface pests in 20- and 40-foot containers loaded with various items including metals, plastic, towels and toilet paper (Ren and Newman 2015). Further trials are continuing for the use of ethyl formate for in-transit fumigation of containers from Perth to Barrow Island, Western Australia (Ren et al. 2017). Ethyl formate is non-toxic and generally regarded as safe for use in foods, and a formulation in carbon dioxide is already registered for use in Australia.

Recommendation 5

The department should continue to reduce its dependence on methyl bromide gas for fumigation and consider assessing and approving alternative treatments.

Department's response: Agreed.

The department is continuing to investigate alternatives to methyl bromide gas for fumigation and is also continuing to assess and approve alternative treatments where relevant.

In general, the department and its associated overseas and industry collaborators appear to be managing the external biosecurity risks of break-bulk cargo well. However, large complex consignments may sometimes overwhelm available inspection resources. The biosecurity inspection teams at Port Kembla and other ports contain very experienced staff with high levels of expertise in finding and removing pests and contamination from complex vehicles and machinery. However, pressures will continue to increase. For example, due to cessation of domestic car manufacturing, Australia will import more new cars. In February 2018, New Zealand refused access to three ships from Japan carrying 10,000 cars because brown marmorated stink bugs were detected onboard.

Recommendation 6

The department should develop a comprehensive training and rotation program to maintain a pool of competent biosecurity officers with expertise in specialised inspection areas and the experience necessary to cope with peaks in import inspection demand. This program should be regularly reviewed and adequately resourced.

Department's response: Agreed.

The department is further strengthening its training and workforce allocation processes to ensure that specialist biosecurity functions, such as break-bulk cargo inspections, are undertaken by a well-trained and competent workforce in a dynamic demand-driven environment.

5.3 Bulk cargo hold entry pathway

Bulk cargo carriers make up about 40 per cent of vessels in the international shipping sector. During 2017, 11,986 bulk carriers arrived in Australia, accounting for over 70 per cent of all vessel arrivals. Most of these carried commodities such as coal or iron ore, so there was essentially zero biosecurity risk of hitchhikers or contaminants inside their holds. Other shipments included plant-based stock feeds, grains, or fertilisers. There was a moderate to high risk that these could bring in hitchhiker pests or contaminants.

The department imposes strict controls on the importation of bulk goods in ships' holds. This is to ensure that they do not contain exotic pests and contaminants harbouring plant, animal and human diseases. These pests could also cross-contaminate our grain exports if ships' holds are not properly cleaned. For example, plant-based stock feed (imported in bulk) could bring into Australia plant pathogens such as Karnal bunt (*Tilletia indica*) and pests such as khapra beetle, which would have serious impacts on local and export markets. Seeds of exotic invasive weeds and other plant pests could also be introduced in this way.

Because of the size of bulk vessels and variability between them, bulk vessel inspections are complex. As a result, to manage these risks, special protocols and work instructions have been developed for inspecting ships' holds. Inspection officers must have a comprehensive understanding of the relevant bulk vessel inspection instructional material and adapt to the wide range of circumstances they might encounter during a bulk vessel inspection.

A biosecurity officer must inspect all accessible areas of the bulk vessel, except holds under ballast and holds already loaded, as far as it is appropriate to do so. Inspectors must work at heights, in poorly lit confined spaces, on slippery surfaces and possibly with noxious gases. For safety reasons inspections must occur during daytime with two officers present. It can take up to two years for an inspection officer to be fully accredited and trained.

There is a real prospect that the inspections currently being done by biosecurity officers could one day be done using new technology. For example, CSIRO has developed a Cybernose® biosensor which can pick up minute traces of odours. The device mimics the sophisticated smell receptors of nematode worms, re-engineered to emit light which changes colour when a specific odour binds to the sensor. The current target is the smell of specific insect contamination in grain. Future projects will address other biosecurity targets in other commodities.

Drone technology is playing an increasing role in the maritime industry for inspection and survey work. Drones could easily be adapted for biosecurity inspections of hulls, potentially reducing costs, increasing efficiency and improving safety.

The Cybernose® and other technologies may be used in the future to carry out the dangerous and unpleasant work of inspecting ships' holds and hulls.

Recommendation 7

The department should continue to work with research and development organisations and industry to develop automated inspection capability for containers and for ship bulk cargo holds and hulls.

Department's response: Agreed.

The department is currently working with a research organisation to explore the potential use of emerging scanning technologies to automatically detect the presence of pests or contamination.

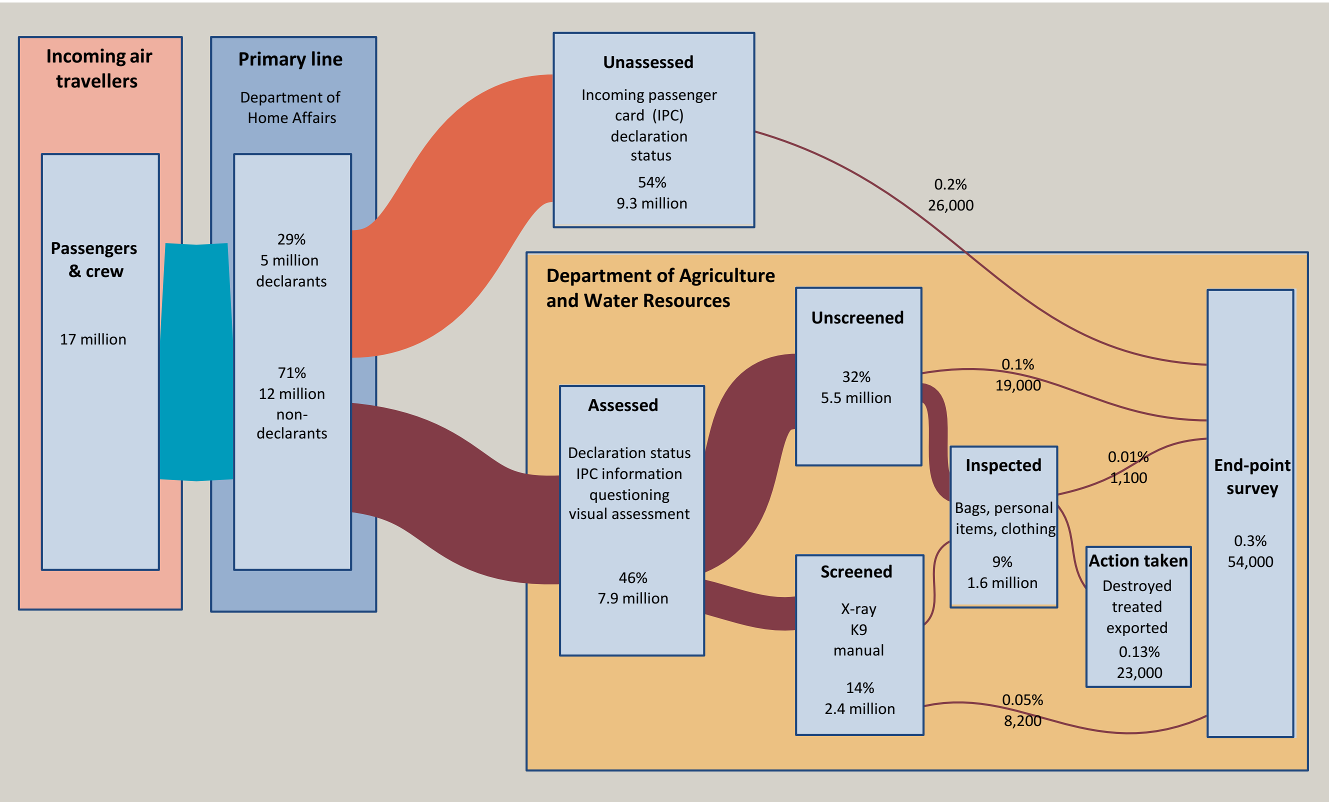
Chapter 6

Aircraft and air cargo entry pathway

In 2015–16 over 183,000 international flights carried over 18 million passengers into Australia. Also, over two million commercial air cargo consignments arrived—52 per cent into Sydney, 27 per cent into Melbourne, 9 per cent into both Brisbane and Perth and the rest into Adelaide and Darwin.

Of these arrivals, 5 per cent (110,000) were referred to the department. Of those referred, 40 per cent required some sort of intervention. Of these, 10 per cent (11,000) were non-compliant (Figure 19). For the same period, 31 million non-commercial air cargo consignments (valued up to $1,000) arrived in Australia. Of these, 24 per cent (160,000) required intervention. Of these, only 1 per cent (7,600) was non-compliant.

FIGURE 19 Commercial air cargo pathway, 2014–15



Note: Percentages shown are percentages of the total 2 million declarations.
Source: Department of Agriculture and Water Resources

Aircraft and air cargo pose relatively low biosecurity risks from hitchhikers and contaminants, although insects, especially mosquitoes, and occasionally other animals can hitchhike in passenger cabins or air cargo containers or holds. Between 2012 and 2017 over 84,000 pests—85 mosquitoes, 84,000 other insects, 60 reptiles, six mammals, 20 amphibians and seven birds—were recorded in air cargo or cargo holds.

General aircraft sanitation measures manage these risks effectively. When any aircraft is flying into Australia, the captain must report to the department if:

- there is any animal or plant in the cabin of the aircraft
- an animal died in the cabin during the flight, and/or
- prescribed disinsection measures have not occurred.

The report must be made when the aircraft is as near as possible to top of descent or 30 minutes before the aircraft is expected to arrive at its first landing point in Australia. If the captain does not report any of these events, the aircraft is automatically given positive pratique (permission, after landing, to embark or disembark, discharge or load cargo or stores). However, if the captain reports any of these events, departmental officers meet the aircraft on arrival, and all passengers and crew must remain on board until departmental officers authorise pratique.

Apart from treating an individual aircraft where hitchhiker problems are detected, enhanced measures may be put in place for specific pests, seasons and/or pathways, as indicated by interceptions. For example, as outlined in the Inspector-General's management of biosecurity risks posed by invasive vector mosquitoes (Inspector-General of Biosecurity 2017), the department, on instruction from Department of Health (Chief Human Biosecurity Officer), has on occasion implemented mandatory additional aircraft disinsection measures for flights from specific destinations after intercepting invasive vector mosquitoes from those ports.

Risk goods such as food waste, unused aircraft inflight provisions and aircraft cleaning residues are subject to biosecurity control and can only be removed from the aircraft with the permission of a biosecurity officer. Industry conducts the removal and disposal activities under either:

- an entity under an approved arrangement with the department
- supervision by a biosecurity officer of all elements and not otherwise conducted by an approved arrangement site operator.

The department also works with airlines to educate international passengers before departure and during flight about Australian biosecurity requirements; and to limit the amount of unused food that leaves the plane.

There is a risk that hitchhikers and contaminants can enter the country through passengers and mail that arrive by air. Therefore, an extensive and comprehensive program of inspection of incoming passengers and mail is used to control these risks. This inspection program is out of scope for this review.

The policy for the management of hitchhiker pests on aircraft is well established. However, aircraft biosecurity management policy is not as developed or as comprehensively stated as the policy for the commercial vessel pathway. Developing a similar framework for aircraft management would help ensure the policy is comprehensive, transparent and applied consistently. It would also enable the department to better understand compliance within the pathway through capturing, analysing, reporting and actioning findings. These features are essential for a regulator to ensure that appropriate steps are taken to improve voluntary compliance, remove impediments to compliance, improve transparency of compliance within the pathway and the industry, and improve engagement of and relationships with industry.

Recommendation 8

The department should develop a policy framework for biosecurity management of aircraft similar to its policy for the biosecurity management of commercial vessels.

Department's response: Agreed.

Work has already commenced to develop a policy framework for biosecurity management of aircraft.

Chapter 7

Seasonal hitchhiker pest risk management

Extra targeted biosecurity risk management measures have been devised for a number of seasonal hitchhiker pests of particular concern to Australia.

7.1 Brown marmorated stink bug (*Halyomorpha halys*)

The brown marmorated stink bug is a pest of over 100 agricultural and horticultural plants. It damages many fruits and crops, such as maize and soybean, by preventing early development or making near-ripe fruit unsaleable as fresh fruit. The bugs may also infest houses, causing significant amenity and human health impacts.

The brown marmorated stink bug is native to China, Japan, Korea and Taiwan. It spread to the US in the late 1990s, Canada in the late 2000s and Europe between 2007 and 2013 (CABI 2013). In the US, with no native predators, the bug reached pest levels by the early 2000s, becoming more cold-tolerant and pesticide-resistant. It is still spreading there and, more recently, in Europe despite attempts at eradication.

The overwintering behaviour of adult bug increases the chance that they may be moved between locations. In the autumn, large numbers of adult insects seek dark, sheltered spaces to hibernate. Brown marmorated stink bug may be present in household items like furniture, new or used vehicles and shipping containers packed for export during the northern winter. When the ships cross the equator, the bugs come out of hibernation early and begin to breed, forming large populations by the time they arrive in Australia (and also New Zealand).

Brown marmorated stink bugs have been identified in very large numbers since December 2014 as a seasonal pest requiring specific attention, particularly for break-bulk cargo shipped from the US in the September to April period (Table 7). Since 2016 invasion of parts of Europe by the brown marmorated stink bug has also necessitated special attention to cargo shipped in the same period from Italian ports.

TABLE 7 Brown marmorated stink bug interceptions, by countries of origin and pathway, 2012–2017

Country of origin	Air cargo	Air baggage	Sea cargo	Commercial vessel	Mail	Empty container	FCL/LCL container	Total
United States	3	3	76	30	1	1	44	158
Italy	0	0	20	1	0	0	27	48
China	0	3	6	5	0	0	23	37
Japan	0	2	11	2	0	0	2	17
Belgium	0	0	5	1	0	0	0	6
Unknown	0	1	3	2	0	0	0	6
Other (11 countries)	1	1	8	6	1	0	4	21
Total	**4**	**10**	**129**	**47**	**2**	**1**	**100**	**293**

FCL Full container load. **LCL** Less than full container load.
Source: Department of Agriculture and Water Resources

The department has responded progressively by requiring extra offshore fumigation and onshore inspection and treatment for an increasing range of target goods. For example:

- From 1 September 2017 offshore treatment was mandated for all target used break-bulk and containerised sea cargo from the US and Italy. New goods did not require offshore treatment if manufactured on or after 1 December 2017. Measures for Italy included targeting cargo from other European ports if the goods were manufactured or stored in Italy during the risk season. Containerised cargo (FCL, FCX and LCL) would be held on the wharf and separated from non-brown marmorated stink bug CAL containers until all required information had been provided to the department for direction. Break-bulk goods from target ports required treatment within 48 hours onshore, on a wharf or at a nearby approved facility.
- On 17 January 2018 mandatory offshore treatment was extended to all containerised sea cargo (new and used) originating from Italy. There was no change to the measures affecting target break-bulk from Italy or goods from the US.
- On 15 March 2018 LCL consignments from Italy had to be held at the wharf on arrival to allow for the cross-contamination risk to be managed before the goods were moved and deconsolidated, especially if the LCL included goods from Italy and other countries.

The 2018 brown marmorated stink bug season finished on 1 May, but measures will need to start again in September. The increased and necessary measures being placed on containers from Italy also increases the pressure on an already stressed biosecurity system as more resources are committed to prevent an incursion of the bug.

7.2 Asian gypsy moth (*Lymantria dispar*)

The Asian gypsy moth (AGM) is a destructive pest of forest, horticulture and the environment. Its larvae feed on over 650 different species of plants. A large larval population on a single tree may kill the tree directly or make the tree more susceptible to other pests or diseases.

The natural range of the AGM is the temperate latitudes running from Europe across to Asia. European gypsy moth was intentionally introduced into North America in the 1860s to breed a more resistant hybrid silk-spinning caterpillar species. Some moths escaped and became established throughout north-eastern US and eastern Canada. However, the rest of the region remains free of AGM and the US and Canadian governments continue to undertake active control measures to limit spread within their countries.

The AGM is considered to have much greater invasive potential than the European variant because mated females may fly and lay eggs far away. The AGM has not yet become established outside of its natural range, but incursions occur periodically in North America. Isolated live moth incursions have been found in the southern hemisphere. So far they have been successfully eradicated.

International distribution of the moth primarily occurs through the transport of egg masses on cargo and vessels. The eggs can easily survive until the environment is suitable for hatching. A moth breeds only once a year and the eggs, once laid, will only hatch after a period of 60 or more days of cold temperature followed by a period of increased temperature (such as when travelling across the equator). Moths are attracted to the UV spectrum of many lights used around industrial facilities, ports and vessels, increasing the likelihood of the mated female laying eggs on vessels or cargo.

New Zealand, the US, Canada and Chile, together with Australia, all have specific requirements targeting AGM on arriving vessels. While these requirements are broadly similar to those of Australia, these other countries rely more on certification of a vessel's status regarding AGM. Australia defines 1 June to 30 September as the risk period for vessels that are arriving from all ports in Far East Russia, Japan, North Korea, South Korea and China above 31° North and which remained for at least 60 days above 31° North or below 50° South. The other AGM regulators vary the risk period based on region, and they also include Okinawa in Japan, which is further south than 31° North.

All countries require pre-arrival reporting for vessels, including information on risk ports visited and the date of each visit. Australia and New Zealand require notification if the visit occurred within the last 12 months, while for the others it is within the last 24 months.

Australia does not require offshore certification but will consider it when risk assessing arriving vessels. Offshore certification for AGM may be undertaken by approved third parties or government bodies. Approved third parties are currently recognised in Japan, but the remaining risk countries are serviced by government bodies.

Inspections for offshore certification occur either at the last port of call in a risk area visited during the risk period or at any non-risk port afterwards but before entering a port in Australia, New Zealand, the US, Canada or Chile. Inspections at a port in a regulated risk area must be done as close as possible to the departure of the vessel to ensure no further contamination by moth eggs occurs after inspection. All five AGM regulating countries recognise each others' AGM inspections.

Historically, the biggest risk of AGM has been from commercial vessels from Japan (Table 8). However, offshore risk mitigation measures have significantly reduced incidents in recent years, with no recorded incidents in 2016 or 2017. AGM inspections in Australia appear to have been targeted effectively by port of origin and pathway and by season of risk. As a result, fewer whole-of-ship inspections have been needed, far more moths have been found by offshore inspections, and fewer moths have been intercepted on arrival.

TABLE 8 Asian gypsy moth interceptions, by country of origin and pathway, 2012–2017

Country of origin	Sea cargo	Commercial vessel	Cruise vessel	Empty container	Total
China	0	1	0	1	2
Japan	6	30	1	0	37
Republic of Korea	0	3	0	0	3
Brazil	1	0	0	0	1
Russian Federation	0	3	0	0	3
Unknown	0	1	0	0	1
Total	**7**	**38**	**1**	**1**	**47**

Source: Department of Agriculture and Water Resources

7.3 Burnt pine longicorn beetle (*Arhopalus ferus*)

The burnt pine longicorn beetle attacks logs, stumps and standing, dead or dying pine trees (*Pinus* spp.). The beetle rapidly attacks fire-damaged trees, thus reducing the time for salvage of trees with burn damage. It is also a vector of sap stain fungi, which further devalues any harvested timber due to discolouration of the salvaged wood.

The burnt pine longicorn beetle is native to northern Europe, northern Asia and northern Africa. It entered New Zealand in the 1950s and has spread across the North and South islands. Hence, it poses a risk on ships, imported timber and other cargo from New Zealand.

The flight season of adult beetles extends from November to April/May. The beetles are active from dusk to dawn and are attracted to lights on ships and at ports. During this time, the department applies heightened surveillance to manage risks of vessels that contain the beetle departing from New Zealand. This includes sending a burnt pine longicorn beetle questionnaire to targeted vessels through MARS to determine whether a beetle inspection or other mitigation measures are required.

Between 2012 and 2017, 243 interceptions of burnt pine longicorn beetle were recorded in Australia, most on sea cargo and commercial vessels from New Zealand (Table 9). Numerous beetles can be found during a single inspection. In January 2016, 600 beetles were detected on a cruise vessel from New Zealand.

TABLE 9 Burnt pine longicorn beetle interception, by pathway and country of origin, 2012–2017

Country of origin	Air baggage	Sea cargo	Commercial vessel	Empty container	FCL/LCL container	Total
New Zealand	1	35	175	0	9	220
United States	0	0	3	0	0	3
Argentina	0	0	1	0	0	1
Italy	0	0	0	0	1	1
Unknown	0	1	15	1	1	18
Total	**1**	**36**	**194**	**1**	**11**	**243**

FCL Full container load. **LCL** Less than full container load.
Source: Department of Agriculture and Water Resources

7.4 Pre- and post-border cooperation on seasonal pest management

The three examples of seasonal hitchhiker pest management given in sections 8.1, 8.2 and 8.3 clearly demonstrate the value of Australia cooperating closely with other countries that share the same threats, especially New Zealand, and with industry. It is most commendable that the department continues to review and annually update the timing and targeting of seasonal pest programs to meet changing climatic and pest distribution patterns, in close cooperation with New Zealand and other relevant countries. Nevertheless, the serious challenge of brown marmorated stink bug in particular shows the need for targeted surveillance and risks mitigation near first ports of entry, container parks and intermodal transport hubs.

Recommendation 9

The department and state/territory government agencies, industry and port authorities should agree on and cost share measures for monitoring and minimising risks of hitchhiker pests near first points of entry, container parks, intermodal transport hubs and approved arrangement sites.

Department's response: Agreed in principle.

The department will continue to consult and negotiate with all governments, as well as stakeholders, to build on the existing cost sharing arrangements.

Chapter 8

Other key hitchhiker pests

8.1 Exotic invasive ants

Exotic invasive ants are a diverse group of ant species. They are very versatile and adaptable and rapidly establish and spread if introduced. Several are among the most serious global invasive pests. Seven species have national priority for management (Table 10).

TABLE 10 Exotic invasive ant species of national importance and status, 2018

Species	Status	Eradication program
Red imported fire ant (*Solenopsis invicta*)	Localised incursions (NSW and Qld)	Yes (since 2001)
Yellow crazy ant (*Anoplolepis gracilipes*)	Localised incursions (Qld, NT and Christmas Island)	Yes (Wet Tropics World Heritage Area; since 2014); Townsville since 2017
African big-headed ant or Coastal brown ant (*Pheidole megacephala*)	Widely established (NSW, Qld, WA and NT)	Yes (Lord Howe Island)
Argentine ant (*Linepithema humile*)	Widely established (NSW, Vic., SA, WA, Tas. and ACT), localised incursion (Norfolk Island)	Yes (Norfolk Island)
Electric ant (*Wasmannia auropunctata*)	Localised incursions (Qld)	Yes (since 2006)
Tropical fire ant (*Solenopsis geminata*)	Localised incursions (NT, Christmas Island, Cocos Island, Ashmore Reef)	Yes (Ashmore Reef, Tiwi Islands)
Browsing ant (*Lepisiota frauenfeldi*)	Localised incursions (WA and NT)	Yes (since 2013)

Source: Department of the Environment and Energy

Exotic invasive ants can reduce native species diversity and modify habitat structure. They can also severely impact on human health and social amenities. For example, red imported fire ants have painful stings which can cause anaphylactic shock. Pets, livestock and native animals may also be severely affected. Other significant damage may occur through the construction of large nests and ants chewing through electrical insulation. Infestations can render public areas such as parks and playing fields unusable.

Red imported fire ants are a significant global invasive threat with social, economic and environmental impacts. They prefer open and semi-open disturbed ground, easily found in urban and peri-urban areas. They are native to South America but have invaded large parts of southern US. Red imported fire ant venom may cause severe anaphylactic shock—80 human deaths have been recorded in the US to date.

In Australia, the ants were first found in Brisbane in 2001. They had probably been there for at least 10 years before detection. Between 2001 and 2017, the Australian and state and territory governments collectively spent $366.9 million on a National Red Imported Fire Ant Eradication Program and managed to contain the pest within south-east Queensland. Around Brisbane, from 2002 to 2010, 61 per cent (1,749 sites) of known fire ant activity were in areas with significant soil disturbance in the preceding one to three years, mostly due to residential and industrial development (Wylie & Janssen-May 2016).

Red imported fire ant interceptions have occurred in all mainland states. Ant incursions have occurred at:

- Yarwun near Rockhampton, Queensland, 2006–2010 and 2013–2017
- Port of Brisbane, 2001–2012
- Port Botany, Sydney 2014–2017
- Brisbane airport, 2016–2018.

In December 2016 an independent review reported that, if established, the red imported fire ant would ‘surpass the combined effects of many pests we currently regard as Australia’s worst invasive animals (rabbits, cane toads, foxes, camels, wild dogs and feral cats—which cost Australia $964 million each year in 2015 values)’ (PBCRC 2016). As well, current US rates of red imported fire ant based medical consultations suggest that by 2030 there could be up to 140,000 consultations and 3,000 anaphylactic reactions each year due to fire ant stings (Solley et al. 2002). In July 2017 Australia’s agriculture ministers committed a further $411.4 million over 10 years to red imported fire ant eradication.

Yellow crazy ants, so called because of their erratic walking style and frantic movements when disturbed, are tiny, highly aggressive ants. They do not sting, but they spray formic acid to blind and kill their prey. They can swarm in great numbers, killing much larger animals, including lizards, frogs, small mammals, turtle hatchlings and bird chicks, with devastating impacts on native wildlife and entire ecosystems. They live in natural bushland, along waterways, in urban areas and horticultural plantations. In suitable climates, such as the Queensland Wet Tropics, they can form ‘super colonies’ across vast areas, with huge social, environmental and financial impacts. They can become a severe threat to people, especially children and the elderly, as well as pets, and can also damage household electrical appliances and wiring. They also pose a huge threat to agriculture in Australia’s warmer regions, dramatically reducing the productivity of crops such as fruit trees and sugar cane by farming sugar-secreting scale insects and encouraging sooty moulds.

Yellow crazy ants were first discovered in Cairns in 2001. Since then they have been found at more than 20 sites in Queensland and in a large scattered population in Arnhem Land in the Northern Territory. A New South Wales infestation was found at Yamba in 2004 and eradicated by 2010 (QDAF 2016). In May 2018 another infestation was found in Lismore, New South Wales. A month later, a further infestation was discovered 30 kilometres north at Terania Creek (New South Wales Department of Primary Industries 2018). Queensland has started an $11.4 million three-year eradication program, as the ants currently occupy just a tiny part of their potential range. If they became more widely established, there would be significant environmental damage, including possible species extinctions and massive ongoing costs to reduce their impacts.

On Christmas Island the ants have killed millions of the famous red land crabs and robber crabs, both of which play an important role in the island's forest floor ecology. They have created a huge increase in sap-sucking bugs and sooty moulds that severely damage plants and trees, degrading the island's forests and native insects and other small animal populations. Researchers are evaluating the possible use of a biological control agent (a micro-wasp) on Christmas Island to suppress scale insects which produce the honeydew the ants feed on.

Exotic invasive ant risk management

Between 2012 and 2017 the department intercepted exotic invasive ants on 309 occasions (Table 11) through six major pathways, the largest being the sea container pathway. Only two of the top 10 countries of origin (Papua New Guinea and Fiji) were identified as CAL countries.

TABLE 11 Exotic invasive ant interceptions, by country of origin and pathway, 2012–2017

Country of origin	Air cargo	Air baggage	Sea cargo	Sea vessel	Empty container	FCL/LCL container	Total
Papua New Guinea **a**	2	19	5	2	4	4	36
United States	5	2	3	1	0	12	23
China	2	1	2	1	0	12	18
Indonesia	2	5	4	2	0	4	17
Fiji **a**	4	7	2	1	0	2	16
India	3	7	2	0	0	3	15
Kenya	14	1	0	0	0	0	15
Vietnam	6	3	1	0	0	4	14
Malaysia	2	3	1	1	0	4	11
Thailand	3	1	4	0	0	3	11
Unknown **b**	0	1	24	2	4	8	39
Other (40 countries)	14	14	7	5	4	50	94
Total	**57**	**64**	**55**	**15**	**12**	**106**	**309**

a Country action list. **b** Origin undetermined. **FCL** Full container load. **LCL** Less than full container load.
Source: Department of Agriculture and Water Resources

The department conducts targeted surveillance at and near ports using purpose-built traps which are regularly checked. Any ants caught are photographed and sent for identification. Border detections by the department are reported to the relevant state/territory departments so that an integrated response can be mounted. An issue for any surveillance is the plethora of native ant species which must be distinguished from the unwanted exotic ants.

By contrast, New Zealand engages in an innovative National Invasive Ant Surveillance Programme each summer. It sets out hundreds of closely-spaced geo-referenced ant traps around its main ports and airports. The traps are only left out for a day, after which they are all collected and analysed for the presence of any exotic invasive ant species. The location of any positive trap is examined more closely and any ant nests there destroyed, with follow-up baiting and surveillance to ensure success. This program would be extremely difficult and expensive to implement in Australia because of our greater number of ports and our warmer climate, which would mean surveillance is needed year-round.

8.2 Giant African snails (*Achatina fulica*)

The giant African snail (GAS) is a major agricultural, environmental and amenity pest. Individual snails may reach over 20 centimetres in length and weigh over 30 grams. They feed on over 500 different plants, including many ornamentals, most vegetables (especially brassicas), legumes, pumpkins and melons, potato, onion, sunflowers and eucalypts. They may also eat tree bark. Environmental impacts include competition with endemic snail species, which they sometimes also eat, and adversely changing soil properties. Amenity impacts include offensive odours on death and population levels reaching the point where it is not possible to avoid stepping on them on pathways or driving over them on roads, potentially causing skidding.

The snails are long-lived, prolific breeders. A snail may lay between 10 and 400 eggs at a time and from 300 to 1,000 eggs each year in three to four clutches. As they can store sperm, a single snail could produce a large number of offspring following entry into Australia.

The snails were described in east Africa in 1821, then in India in 1847. Since then they have spread through South-East Asia to the Pacific and the Caribbean. During the Second World War they spread significantly with military equipment (Thiengo et al. 2007). After the war, the US intercepted many snails on military equipment returning from the Asia-Pacific. Since the establishment of giant African snails in Hawaii, there have been periodic introductions into continental US. Giant African snails were introduced into Brazil in 1988 (Box 2).

Box 2 Giant African snail invasions in the Americas

The US: one boy, ten years and a million dollars

In 1966 a boy from Florida on holiday in Hawaii took three giant African snails home with him as pets. His grandmother released them in her garden. The Florida state government was alerted in 1969 and by 1973 18,000 snails had been found and destroyed. The overall Florida state eradication campaign took 10 years and cost over US$1 million at that time (Capinera 2011).

Brazil: a new business venture gone wrong

Giant African snails were introduced to Brazil in 1988 for sale at an agricultural show. The snails were intended to be farmed for human consumption. Many of those who tried the venture lost money and their snails were simply released into the wild or thrown into garbage piles. This led to extensive infestation of urban areas and garbage dumps. By 2007 snails were present in 23 of 26 national regions (Thiengo et al. 2007).

Giant African snails are known vectors for the rat lungworm (*Angiostrongylus cantonensis*), which causes eosinophilic meningitis in humans (Tillier et al. 1993). Rat lungworm is already present in Australia, and the introduction of the snails (or other efficient vectors such as the semi-slug (Box 3)) would increase the risk of it being spread to humans. The snails can also transmit various *Phytophthora* species to susceptible plants (Turner 1967).

Box 3 Contaminated containers could bring in the semi-slug

The semi-slug (*Parmarion martensi*) is a small, inconspicuous pest of agricultural, environmental and public health significance. It can inhabit many environments, feeding on a diverse range of fruits, vegetables, food scraps and pet food (Hollingsworth et al. 2007). It can climb to find food. It also likes hiding in soil under rocks and on other organic matter, thereby posing a hitchhiking risk.

The semi-slug is a prolific vector of the rat lungworm (*Angiostrongylus cantonensis*), whose larvae are excreted in great numbers in the slime from the semi-slug, which is deposited as the semi-slug crawls across salad vegetables, fruits and other foods. There is a high risk that people and other animals that may later eat these foods will be infected. The larvae find their way to the human brain, where they cause blinding light and pain flashes, other neurological symptoms and even death. In Hawaii, the invasion of the semi-slug has led to an upsurge in human cases of rat lungworm infestations and brain disease in recent years.

Rat lungworm is present at a very low level in Australia. The introduction of the semi-slug would significantly increase risks of its spread to humans. If contaminated containers from countries with semi-slugs are not cleaned and are released into tropical and subtropical parts of Australia, the risk of semi-slug incursions is unmitigated.

Apart from deliberate introductions, snails may also be inadvertently introduced in soil or on machinery and other objects. They frequently burrow into soil or enter dark, cool and covered areas during the day to avoid predation and adverse environmental conditions. The risk of snails hiding in, on or under objects like sea containers is greatest when they are placed on or next to soil or grassy areas. Arrival pathways for giant African snails into Australia include predominantly sea containers and sea cargo (Table 12).

TABLE 12 Giant African snail interceptions, by top five countries of origin and pathway, 2012–2017

Country of origin	Air cargo	Air baggage	Sea cargo	Commercial vessel	Yacht	Empty container	FCL/LCL container	Total
Solomon Islands **a**	0	0	5	1	0	35	1	42
Papua New Guinea **a**	0	0	3	0	0	13	5	21
United States	0	1	1	0	0	0	4	6
New Caledonia **a**	0	0	2	0	0	2	1	5
Christmas Island **a**	1	0	3	0	0	1	0	5
Other (18 countries)	2	2	20	13	1	9	17	64
Total	**3**	**3**	**34**	**14**	**1**	**60**	**28**	**143**

a Country action list. **FCL** Full container load. **LCL** Less than full container load.
Source: Department of Agriculture and Water Resources

Giant African snails are monitored at or near all ports of entry, especially those that receive CAL containers. CAL containers and cargo are either salt-segregated or snail-bait-segregated from non-CAL cargo by surrounding the cargo with a thick, wide, unbroken ring of salt or snail bait. However, it is possible for these rings to blow away on exposed windy docks or wash away when it rains, making them ineffective. Wet conditions reduce the efficacy of risk management measures and provide the perfect environment for snails to relocate.

8.3 Exotic bees and bee mites

Exotic bees are listed as one of the top 40 plant pests endangering populations of European honey bees (*Apis mellifera*) and native bees. They may cause significant environmental impacts, pose a threat as a pest bee and as a host of bee pests such as the Varroa (*Varroa destructor* and *V. jacobsoni*), Tropilaelaps (*Tropilaelaps clareae* and *T. mercedesae*) or tracheal (*Acarapis woodi*) mites. If a species of exotic bee became established in Australia, numerous pollination-dependent industries, such as fruit and nut industries, would be significantly affected. Threatening species of exotic honey bees include Asian honey bees (*Apiscerana*), African honey bees (*Apis mellifera scutellata*), Africanised honey bees (*Apis mellifera scutellata hybrids*), Giant honey bees (*Apis dorsata*), dwarf honey bees (*Apis florea*) and Cape honey bees (*Apis mellifera capensis*).

8.4 Mosquitoes

Mosquitoes arguably cause more human suffering than any other organism. Over one million people worldwide die every year from mosquito-borne diseases such as malaria, yellow fever, dengue, chikungunya and Zika. In 2017 the Inspector-General published a report on the biosecurity risks posed by invasive vector mosquitoes (Inspector-General of Biosecurity 2017).

8.5 Rodents

Rats and mice are highly adaptable omnivorous rodents of worldwide distribution and major biosecurity concern. Transmission of bubonic and pneumonic plague ('the Black Death') is the most feared impact, but rodents can vector other serious animal and human diseases and contaminate food and the environment with faeces or urine. They can also devastate crops, cause physical damage to materials through gnawing and burrowing, and reduce environmental biodiversity (Box 4) by competition with marsupials, eating birds' eggs and native plants, and destroying the soil seed bank. Rats have been eradicated from some islands; however, in larger continental areas this is not feasible. It is still important to prevent the arrival of new populations due to their potential impacts.

Rodents are a key target of the Ship Sanitation Certification Scheme under the International Health Regulations because of the risk of spreading human disease. This has been reflected in the design and implementation of MARS, which seems to be managing rodent risks effectively.

Rats and mice have spread throughout the world via human trade and transport. Between 2012 and 2017 the department recorded 21 interceptions of rodents from 15 countries. In many cases a live rodent was not actually seen, but evidence of rodent activity, such as faeces or track marks, was present or a dead rodent was found.

Box 4 Impact of rats on species diversity

Black rats were introduced to Lord Howe Island, Australia, in 1918 following the grounding of a ship on the island. Rats are implicated in the extinction of at least five endemic species of birds and at least 13 invertebrates (Gillespie and Bennett 2017). Internationally, rats and mice have been linked with 75 animal extinctions (52 birds, 21 mammals and two reptiles) (Doherty et al. 2016).

8.6 Black-spined toad (*Duttaphrynus melanostictus*)

The Asian black-spined toad shares the same family *Bufonidae* as cane toads and secretes similar lethal toxins from glands on its back. It has the potential to compete with native species, kill predators that encounter its toxins and spread exotic parasites and pathogens. It has no natural predators in Australia.

Toads are typically intercepted as hitchhikers on vessels, shipping containers and machinery as well as on personal belongings of travellers from endemic regions. Between 2012 and 2017 the department intercepted 24 black-spined toads from five Asian countries, half in air baggage.

There have been several incursions of black-spined toad in Australia. The most recent was in Cloverdale, Western Australia, in November 2017. Previous incursions include Belrose, Sydney in March 2015 and suburban Melbourne in 2014. Each time, only one toad was caught.

8.7 Reptiles

Reptiles present a significant threat to Australia. As yet, no introduced reptiles have been eradicated around the world, despite continued control and management efforts (Reed & Rodda 2009). They can easily establish, as they are hard to find and trap, lack predators and have favourable breeding patterns. Between 2012 and 2017, the department recorded 545 interceptions of reptiles from 45 countries as hitchhikers or illegal imports (Table 13).

TABLE 13 Reptile interceptions, by country of origin and pathway, 2012–2017

Country of origin	Air cargo	Air baggage	Sea cargo	Commercial vessel	Mail	Empty container	FCL/LCL container	Total
Indonesia	19	33	3	7	5	4	10	81
China	1	7	9	1	0	0	38	56
Thailand	2	12	10	4	0	1	22	51
Malaysia	5	4	3	3	0	1	22	38
Singapore	2	5	5	4	0	0	21	37
Papua New Guinea **a**	1	2	10	1	0	8	10	32
United States	2	2	3	2	3	0	9	21
Vietnam	0	8	5	1	0	0	5	19
Solomon Islands **a**	0	4	3	0	0	6	5	18
Fiji **a**	1	11	1	0	0	1	3	17
Other (37 countries)	11	18	15	11	9	9	40	113
Unknown	8	20	12	8		1	13	62
Total	**52**	**126**	**79**	**42**	**17**	**31**	**198**	**545**

a Country action list. **FCL** Full container load. **LCL** Less than full container load.
Source: Department of Agriculture and Water Resources

Chapter 9

Conclusion

The challenges posed to Australia by hitchhiker pests and contaminants are likely to increase, due to increased global trade and movement of people, pests and diseases around the world. Other countries may not prioritise preventive measures as much as Australia (and New Zealand) since certain pests may be endemic there or not pose as much biosecurity risk.

Departmental efforts to manage the risks of hitchhiker and contaminant entry by different pathways are impressive. The risk management regimes for ships, aircraft and air cargo seem well targeted, effective and efficient. The more difficult and complex tasks of preventing hitchhikers and contaminants from entering on or in sea cargo, both containerised and break-bulk, are being tackled with effectiveness and efficiency, but they are not easy to manage.

Continued development of the offshore risk management programs already being implemented by the department, and improved external and internal contamination risk profiling and management, will be necessary but not sufficient to manage future challenges. They will be particularly useful for break-bulk cargo. It will be essential to retain and develop skilled staff and ensure adequate resourcing in order to apply these programs comprehensively.

Offshore measures may result in the biggest reduction of hitchhiker and contaminant risks. They need to be inclusive of shipping lines' responsibility in creating risks (by carrying containers and break-bulk cargo to Australia) and exploring incentive-based compliance systems for ships transporting biosecurity-compliant containers and break-bulk cargo. Such systems need robust onshore verification, with risk-based profiling and inspection regimes on arrival in Australia. However, these onshore regimes are resource-intensive and the biosecurity system is under great pressure from many directions.

Over three million sea containers now enter Australia each year, and volumes are projected to continue to rise. The cumbersome current container inspection and cleaning regimes will not cope with these expected volumes or with development of ever-faster cargo transport systems. New automated methods of container inspection and washing could improve the efficiency and effectiveness of the whole system for external sea container risk management, by targeting high and medium biosecurity risk containers. Industry and government should pursue these as a priority. More automated container washing may give the biggest short-term return in external biosecurity risk reduction.

The adaptive management of new pest threats requires close cooperation with a very broad range of stakeholders. Some seasonal pest risks (Asian gypsy moth and burnt pine longicorn) are being managed effectively, while the expanding global range of brown marmorated stink bugs is still challenging both the Australian and New Zealand biosecurity systems. The department's National Border Surveillance program and stronger links to state and territory governments and industry are both critical in managing known and emerging pest threats.

The department's efforts in dealing with hitchhikers and contaminants are undoubtedly preventing a great deal of biosecurity risk material, pests and diseases from entering Australia. This is of great value not just to agriculture and human health but also to the environment and community amenity. Adequate long-term resourcing of the current complex programs and ongoing development of improved systems will be essential to prevent these efforts being overwhelmed by increasing trade volumes and changing global pest and disease threats.

Appendix A

Agency response

Australian Government

Department of Agriculture and Water Resources

SECRETARY

Ref: EC18-000307

Dr Helen Scott-Orr
Inspector-General of Biosecurity
PO Box 657
MASCOT NSW 1460

Dear Dr Scott-Orr Helen

Thank you for providing your review report, *Hitchhiker pest and Contaminant Biosecurity Risk Management in Australia*, and for the opportunity to provide formal management comments on the findings and recommendations.

I am pleased to advise that the department has agreed or agreed in principle to all of the recommendations. The department's specific comments in response to the recommendations are provided in Annex A.

The department has assessed the report and does not consider any information contained in the report to be prejudicial to the public interest.

Yours sincerely

Daryl Quinlivan

11 July 2018

ANNEX A

Department of Agriculture and Water Resources responses to recommendations

Recommendation 1

The department should modify the MARS software so it can provide:

- ability for ships' masters to list up to five prior overseas ports of call when submitting a Pre-arrival Report,
- real time reporting and visualisation of MARS inspection data and missed inspections, including reasons by port and ship type, for all biosecurity officers and managers, and
- better summary reports for department decision makers and operational staff, and industry, to facilitate timely and targeted risk management.

Response:

Agreed.

The above recommended modifications have been prioritised for future MARS releases.

Recommendation 2

The department should expedite the upgrading of the S-Cargo software system so it can better manage container and cargo contamination risks, including rural tailgate container inspections.

Response:

Agreed.

The department is progressing the enhancements to the S-Cargo software system as a priority. These enhancements will strengthen the department's ability to manage the biosecurity risks entering Australia on the surfaces of sea containers and breakbulk cargo. However, the department's ability to better manage container risks is also reliant on the progression of profile changes in the Integrated Cargo System (ICS). As rural tailgate inspections cannot be managed through the S-Cargo system, the department is considering enhancements to the Agriculture Import Management Systems (AIMS) to implement reforms to rural tailgate inspections. In addition, the department is developing a mobile tailgate application for inspectors to capture inspection results.

Recommendation 3

The department should prioritise allocating resources to expand the Sea Container Hygiene System, to better enable offshore management of sea container biosecurity risks from more countries and ports.

***Response*:**

Agreed.

The department will ensure adequate resources are allocated to prioritise expansion of the Sea Container Hygiene System (SCHS) to more countries and ports. However, the uptake of SCHS is dependent on the level of interest shown by industry and overseas government agencies.

Recommendation 4

The department should require major sea container receival operators to clean high and medium external risk containers to an acceptable standard before they are transported from the port, removing the need for most on-wharf six-sided inspections and subsequent manual cleaning when biosecurity risk material is found. Automated cleaning facilities should also be built into rail infrastructure installed to transport containers to intermodal hubs so that all containers being transported by rail are cleaned before leaving the port, while low risk containers leaving by truck continue to be subject to risk-based wharf gate inspections.

***Response*:**

Agreed in principle.

The department notes the role of automated methods of container cleaning in risk management of sea containers. However, introduction of automated cleaning facilities could conflict with the promotion and expansion of offshore management options (recommendation 3 refers). Further, the effectiveness of these facilities in managing hitchhiker pests and molluscs needs to be assessed. In light of this recommendation, the department, in consultation with industry, will assess the impact of the introduction of these facilities on efficiency of container management at ports and whether mandating a specific technology solution is warranted. The department will consult with industry as part of this assessment.

Recommendation 5

The department should continue to reduce its dependence on methyl bromide gas for fumigation and consider assessing and approving alternative treatments.

Response:

Agreed.

The department is continuing to investigate alternatives to methyl bromide gas for fumigation and is also continuing to assess and approve alternative treatments where relevant.

Recommendation 6

The department should develop a comprehensive training and rotation program to maintain a pool of competent biosecurity officers with expertise in specialised inspection areas and the experience necessary to cope with peaks in import inspection demand. This program should be regularly reviewed and adequately resourced.

Response:

Agreed.

The department is further strengthening its training and workforce allocation processes to ensure that specialist biosecurity functions, such as break-bulk cargo inspections, are undertaken by a well-trained and competent workforce in a dynamic demand-driven environment.

Recommendation 7

The department should continue to work with research and development organisations and industry to develop automated inspection capability for containers and for ship bulk cargo holds and hulls.

Response:

Agreed.

The department is currently working with a research organisation to explore the potential use of emerging scanning technologies to automatically detect the presence of pests or contamination.

Recommendation 8

The department should develop a policy framework for biosecurity management of aircraft similar to its policy for the biosecurity management of commercial vessels.

Response:

Agreed.

Work has already commenced to develop a policy framework for biosecurity management of aircraft.

Recommendation 9

The department and state/territory government agencies, industry and port authorities should agree on and cost share measures for monitoring and minimising risks of hitchhiker pests near first ports of entry, container parks, intermodal transport hubs and approved arrangement sites.

Response:

Agreed in principle.

The department will continue to consult and negotiate with all governments, as well as stakeholders, to build on the existing cost sharing arrangements.

Glossary

Term	Definition
Break-bulk cargo	Non-containerised cargo
Country action list (CAL)	A list of countries from which risk of pests and other biosecurity risks entering Australia on containers or break bulk cargo is high
CAL inspection	A six-sided inspection of a container or break-bulk cargo from a CAL country
Integrated Cargo System (ICS)	A Department of Home Affairs owned software system. All sea cargo, import and export, is reported into the ICS
Low-level contamination (LLC)	Includes low levels of soil, plant or animal-based contamination that can be removed immediately on site in less than five minutes
High-level contamination (HCL)	Includes: • all live pests • quantities of soil, plant or animal material that cannot be removed on site in less than five minutes • contamination that cannot be accessed for cleaning or where mechanical means are required for removal
Maritime Arrivals Reporting (MARS)	Online system for reporting biosecurity arrival requirements and findings for all international vessels coming to Australia
S-Cargo	Department application that allows biosecurity officers to: • electronically manage holds and releases on cargo subject to CAL inspection • update cargo status in the ICS
Sea Container Hygiene System	An Australian, New Zealand and industry initiative to manage biosecurity risks associated with sea containers at the port of loading
Vessel Compliance System (VCS)	Online system for recording vessels' compliance with biosecurity requirements and resultant level of inspection

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