

Guidance on preventing the movement of invasive species between islands in Pacific countries and territories



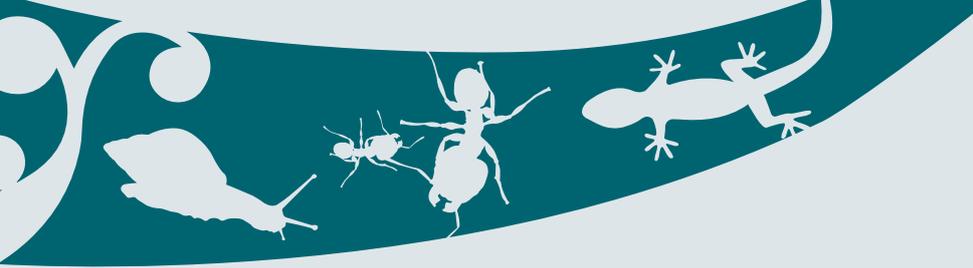
Disclaimer	<p>This publication has been made possible by funding from New Zealand Ministry of Foreign Affairs and Trade (MFAT) as part of the Management of Invasive Species for Climate Change Adaptation in the Pacific (MISCCAP) programme.</p> <p>This document reflects the latest technical information at the date of publication. As it will need to be updated regularly, please check The Department of Conservation Te Papa Atawhai (DOC) website (www.doc.govt.nz) to ensure you are using the latest version.</p>
Prepared and published by	<p>The Department of Conservation Te Papa Atawhai (DOC) PO Box 10420 Wellington 6143 New Zealand www.doc.govt.nz</p>
Approved for use by	<p>Director Terrestrial Biodiversity Department of Conservation Date: 20/03/2023</p>
Editing and design	<p>Bolster Design www.bolster.co.nz</p>
Last reviewed	<p>January 2023</p>
Citation	<p>The Department of Conservation Te Papa Atawhai (DOC) 2023. Guidance on preventing the movement of invasive species between islands in Pacific countries and territories. Department of Conservation, Wellington, New Zealand. 68 p.</p>

Development of this document

The need for this guidance document was identified through consultation with National Invasive Species Coordinators (NISC), Pacific Regional Invasive Species Management Support Service (PRISMSS) partners, and other Pacific invasive species management practitioners.

This document is a key output under the 'Managing Invasive Species for Climate Change Adaptation in the Pacific' (MISCCAP) project.

This document was informed by New Zealand's Department of Conservation (DOC) *Island biosecurity best practice: Quarantine guidelines*, which aim to protect offshore ecosystems and native species from the negative impact of invasive species on Department of Conservation managed islands.



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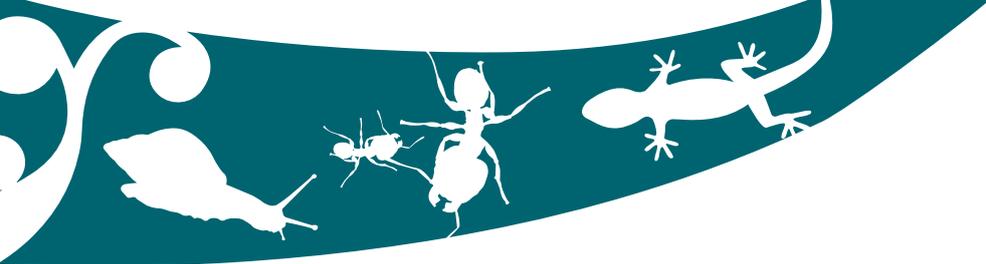
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ABOUT THIS DOCUMENT

Who is this document for?

The guidance in this document is for invasive species management practitioners and local authorities in Pacific countries who wish to improve biosecurity for their islands.

Preventing invasive species from spreading between islands is everyone's responsibility and is to everyone's benefit. This document provides guidance on biosecurity measures for anyone involved in inter-island travel, trade, and transport.

What is this document for?

The guidance in this document facilitates increased stakeholder participation by providing tools for invasive species management practitioners and local authorities to:

- understand and upskill in inter-island biosecurity;
- raise biosecurity awareness among communities;
- provide pre-departure biosecurity guidance to people moving between islands;
- guide stakeholders involved in moving goods and people between islands to implement control measures to prevent the inter-island movement of invasive species; and
- use animal control devices appropriately.

Countries or territories may have existing inter-island biosecurity regulations or procedures. This guidance does not replace those regulations or procedures.

This document focuses on inter-island biosecurity. It is consistent with the biosecurity goal outlined in the [Guidelines for invasive species management in the Pacific](#) — 'Prevent the spread of invasive species across international or internal borders.'

This document provides detailed protocols that expand on the information in the Battler Series guide [Protect our islands with biosecurity](#).

What is included?

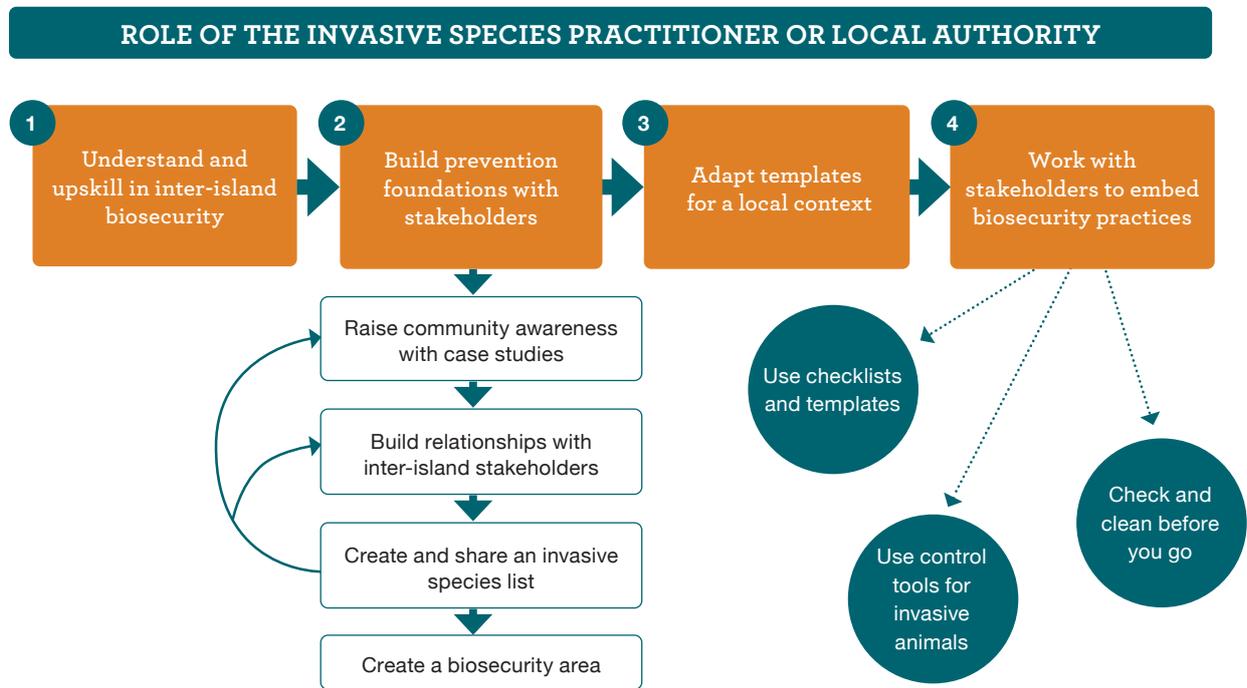
- Information about inter-island biosecurity and invasive species management.
- Case studies of invasive species moving along biosecurity pathways.
- Guidance for practitioners working with communities to increase stakeholder participation in invasive species management.
- Templates that can be adapted by practitioners for individual stakeholders moving people and other items via inter-island biosecurity pathways.
- Checklists and information sheets that can be adapted and shared with stakeholders.

What is excluded?

- Biosecurity at the international border.
- Early detection and rapid response. Refer to the Battler Series guide [Catch it early: Invasive species early detection and rapid response](#), and to the [Early detection rapid response toolkit](#).
- Tools to run a public awareness campaign on inter-island biosecurity. Refer to the Battler Series guide [Campaign to battle invasive species in the Pacific](#).
- Marine invasive species. Refer to the Battler Series guide [Manage marine biosecurity in the Pacific](#).



How to use this document



Rarotonga. Photo: K. Steffens (DOC)

With every turn of the tide, look around us, at this plentiful way of life. These islands are all that we have, and they are vulnerable to invasive species. We must guard them as if our lives depend on it – because it does.

Adapted from **Ko Tātou This is Us**

1. INTRODUCTION

1.1 What is biosecurity and why is it important?

Biosecurity is the practice of protecting places from the negative effects of harmful new diseases, plants, and animals that do not naturally occur there. These invasive species can threaten biodiversity, ecosystems, natural resources, food security, and human health.

Islands are particularly vulnerable to invasive species as they are home to many endemic plant and animal species that have not evolved to cope with the predators, weeds, and diseases found on continents.

Island economies also rely heavily on imported goods and tourism. This increases the risk of accidentally importing invasive species, causing major socio-economic impacts across the Pacific region. For example, the accidental introduction of taro leaf blight to Samoa caused a 95% reduction in the supply of taro to the public market in 1993.

1.2 Why focus on prevention?

Eradicating or controlling an invasive species is expensive, so it makes sense to focus on preventing their introduction to an island in the first place. The earlier an invasive species is found, the more likely it will be successfully removed. Preventing the arrival of an invasive species avoids the high cost of subsequent management and any negative impact it might have on the local economy and native biodiversity.

Preventing the spread of invasive species between islands will become more challenging with the effects of climate change. Many invasive species thrive on disturbance so they will benefit from more frequent storms and cyclones, which also help them to spread. Increasing temperatures mean that different invasive species will be established and existing invasive species will change distribution patterns. Implementing the biosecurity measures in this guidance document will ensure better prevention of invasive species today and in the future.

CASE STUDY

Stowaway coconut rhinoceros beetles on plant material

In 1909 the coconut rhinoceros beetle was accidentally introduced, probably on rubber plant cuttings, to Samoa. The beetle population rapidly increased and caused severe damage to coconut palms, which are essential as food for the local population and as an export crop. In subsequent years, the beetle spread throughout the Samoan islands, probably through accidental transport on local shipping. It has now spread to several surrounding countries including Tonga and Fiji in the 1950s, and once within these countries, spread throughout the island groups. In the absence of effective control measures, the beetle can cause a palm mortality of 50% or more, severely affecting people's livelihoods.



Coconut rhinoceros beetle. Photo: Arian Suresh, CC BY 2.0

1.3 What is inter-island biosecurity?

Inter-island biosecurity refers to measures put in place to prevent the movement of invasive species and diseases between the islands of a territory, nation, or island group.

In this document we use 'border' to indicate an island's border with the sea or lagoon. We focus on travel, trade, and transport between islands, within a country, or a territory.

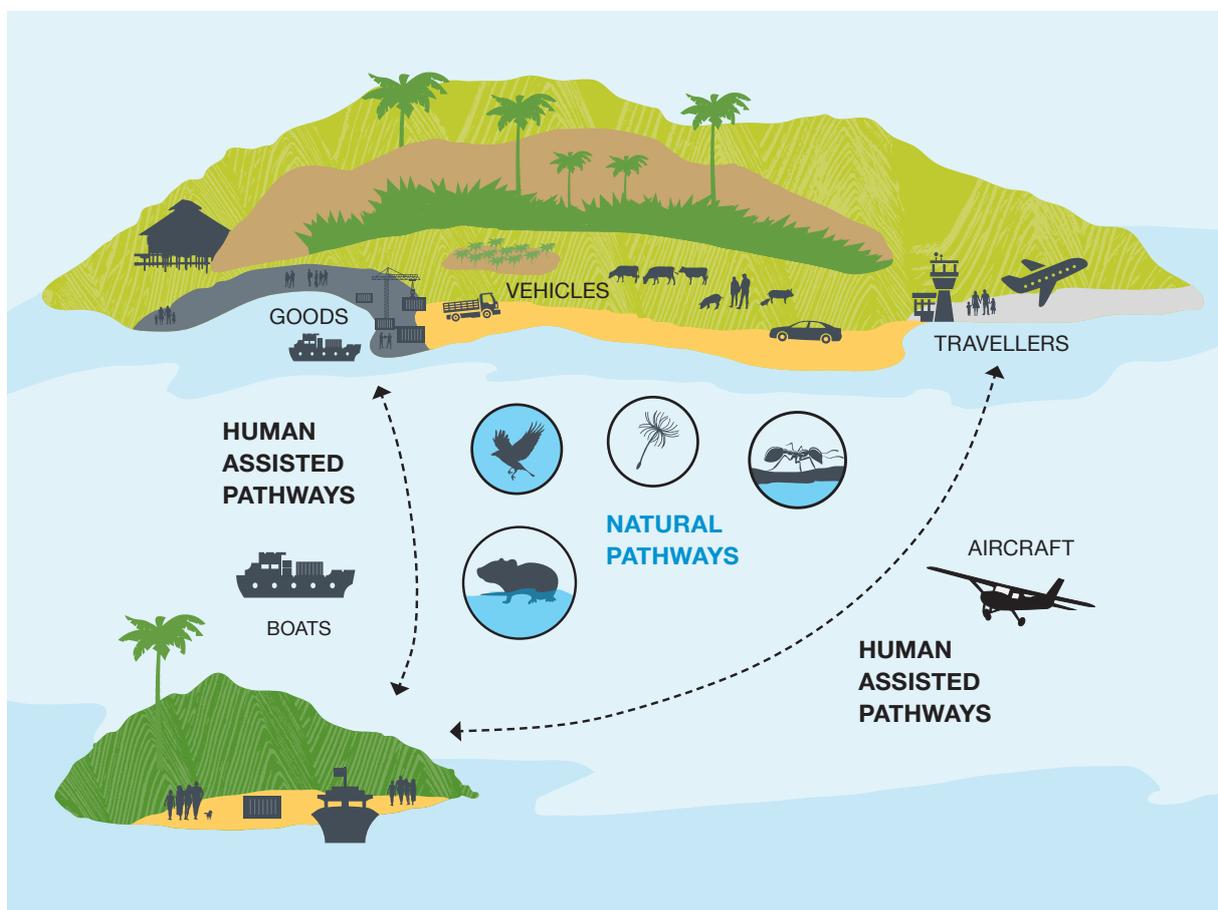
The ocean provides a natural barrier to the movement of terrestrial invasive species. Water minimises the chance of species spreading through floating, flying, or swimming. Invasive species are most likely to move between islands using human-assisted pathways, such as the movement of people, their personal belongings, food, goods, livestock, and nursery plants.

IMPORTANT: Prevention of the movement of invasive species between islands involves identifying the pathways they may use to travel to an island and applying actions to minimise risks from each pathway.

International pathways have limited departure and arrival ports, providing convenient 'bottlenecks' where strong regulatory function can be applied. In contrast, movement between domestic beaches, jetties, and ports is not restricted, making it more difficult to monitor.

Therefore, non-regulatory management tools, such as this guidance document, play an important role in preventing invasive species from moving across domestic borders.

INVASIVE SPECIES PATHWAYS BETWEEN ISLANDS



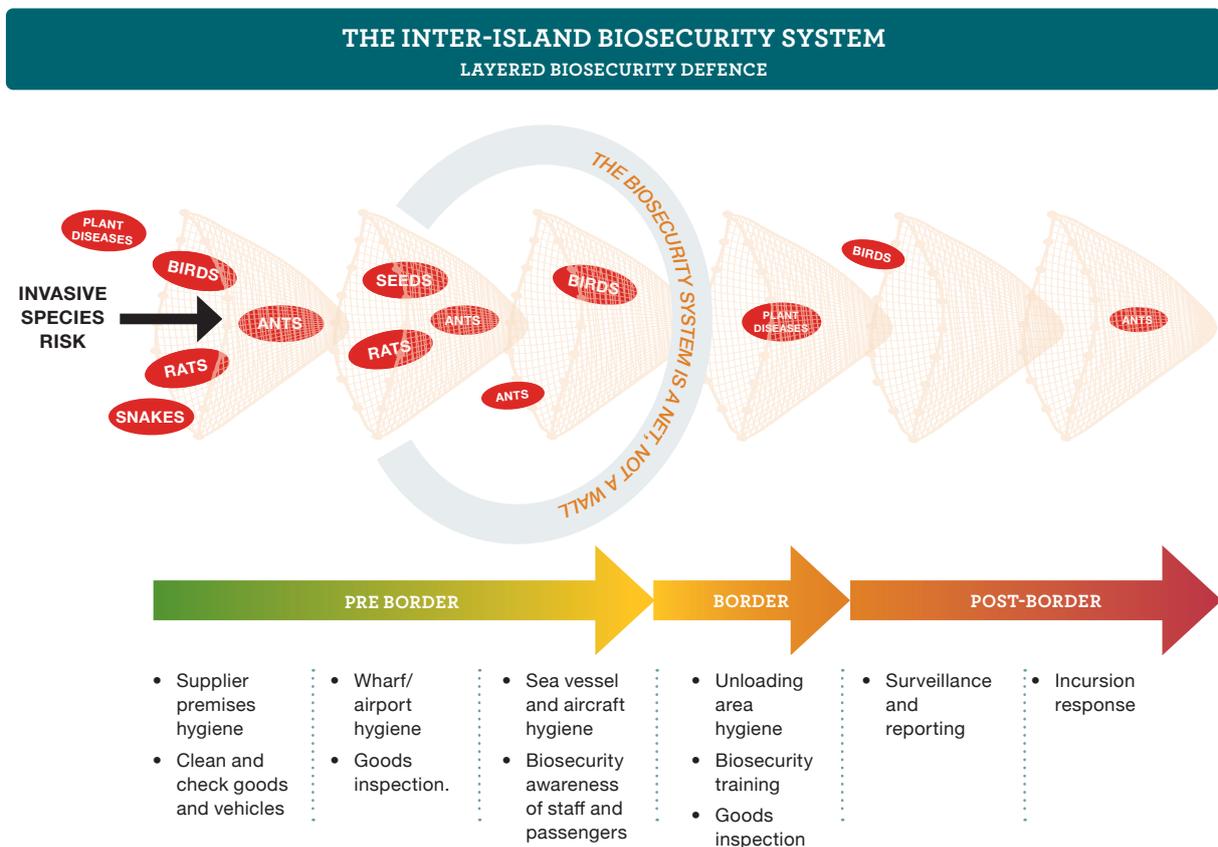
1.4 What is biosecurity risk management?

Biosecurity is primarily about reducing risk. A biosecurity system has multiple defence lines, with most of the effort focused on prevention measures pre-border and at the border.

Managing biosecurity pathways to prevent the spread of all invasive species (rather than targeting specific invasive species) is the most effective approach to preventing invasions.

The term ‘prevention’ is used in this document as a target. Even with the best prevention systems in the world, invasive species may still slip through.

Surveillance is implemented post-border to enable early detection of any invasive species that evaded prevention or arrived along natural pathways. Rapid action is taken to eradicate the invasive species, while it is still feasible.



Biosecurity New Zealand (adapted from their original model)

CASE STUDY**Stowaway small Indian mongoose in shipping containers**

Sea containers have been identified as a major pathway for the transport of invasive species as stowaways.

In 2016, six small Indian mongoose hitched a ride from Fiji to Tonga inside a shipping container carrying a load of paint. Unfortunately two mongoose escaped on arrival in Tonga. A trapping and poisoning operation was carried out to target the escaped mongoose and it is likely that they were successfully poisoned as they were not seen again.

Sea containers are also a high-risk pathway for the movement of red imported fire ant and other ant species.

It's common to find plant seeds in containers, often in the grille of refrigeration units.

Region-wide adoption of sea container hygiene systems would reduce the risk posed by this pathway.



Small Indian mongoose. Photo: J. N. Stuart, CC BY-NC-ND 2.0



2. ENCOURAGING STAKEHOLDERS AND COMMUNITIES TO PARTICIPATE IN INTER-ISLAND BIOSECURITY

This guidance document facilitates increased inter-island stakeholder and community participation in biosecurity by providing tools for invasive species management practitioners and local authorities to:

- raise biosecurity awareness among communities;
- build relationships with inter-island stakeholders;
- create and share an invasive species list;
- create or enhance a biosecurity area; and
- detect invasive species on arrival at the destination island.

2.1 Raise community awareness

Objective

- **To increase community awareness, support and initiate behaviour change to prevent the inter-island movement of invasive species.**

Raising awareness among communities involved in the inter-island movement of goods and people is key to the success in preventing the movement of invasive species between islands. Enhancing awareness (about the negative impact of invasive species on things that are important to communities, how these species spread, the cost of management if an invasive species establishes, and what they can do to help prevent invasive species spread) is fundamental to see action within a community.

Leading change can be challenging. Behaviour change is more likely to be sustainable if guidance involves direct contact with people and is carried out at the community level, rather than just printing off and distributing materials. Build relationships with island or village councils to ensure effective buy-in from local communities. Every community is different, and you will know the best approach to take in your situation. Refer to the Battler Series guide [Campaign to battle invasive species in the Pacific](#) for tools to support you to create a cost-effective communication strategy.



Key messages

- The effectiveness of inter-island biosecurity is determined by the level of local community awareness of the risks of an invasive species spreading between islands, and what they can do to reduce those risks.
- Face-to-face contact and support are the most effective methods of achieving positive behaviour change.

Recommended actions

1. Confirm support or a mandate for inter-island biosecurity from the relevant authorities.
2. Consider when and where to raise awareness. Liaise with communities through village or island councils to generate support for biosecurity.
3. Use the case studies in this document to provide motivation.
4. Inform the community on how they can help. Keep messaging simple and clear. For example, demonstrate how to 'Check your boat and gear'.
5. Share the Priority invasive species list (Section 2.3) so people know which invasive species to check for.

2.2 Build relationships with inter-island stakeholders

Objective

- **To build trust and understanding with inter-island stakeholders to provide a foundation from which to guide the implementation of effective inter-island biosecurity practices.**

Building relationships with stakeholders who have an interest in inter-island biosecurity (suppliers, transport operators, travellers, port, and airport authorities) is the most important part of your role in driving change for better inter-island biosecurity in your country.



Key messages

- Understanding the local context will enable you to better understand the capacity of the stakeholders involved and the regulations in place before you build on current or new relationships.
- Building and maintaining relationships by having a presence (supporting and checking the uptake of biosecurity measures) is an ongoing process. Being present can facilitate behaviour change to enhance voluntary biosecurity compliance.

Recommended actions

1. Know the local context.
 - a. Work with the community and local authorities to create a list of inter-island stakeholders (suppliers, transport operators, travellers, port, and airport authorities), in your country or territory. Sort each stakeholder into their relevant biosecurity pathway (Section 3). They may fit into more than one. For example, 'Movement of construction materials' and 'Movement of over-sized goods' could both apply to a building company.
 - b. Although the focus of this document is on enhancing voluntary compliance, check with authorities about any relevant

regulations. An example of this is the [internal quarantine movements of fruit and vegetables in the Cook Islands](#).

2. Work with stakeholders.
 - a. Ensure stakeholders understand the importance of their role in inter-island biosecurity.
 - b. Ask stakeholders for their ideas on how to keep their products or transportation clean and free of invasive species
 - c. Use the templates in Section 3 to provide targeted support for stakeholders. For example, remote islands with a small population and limited resources will likely only have the capacity to implement basic biosecurity measures.
 - d. Observe and celebrate the people and organisations doing the right thing. Provide additional support to those stakeholders who are struggling to implement biosecurity measures.
3. Be present.
 - a. Share the priority invasive species list with stakeholders (Section 2.3) and explain why it is important to prevent their movement between islands.
 - b. Check supplier premises, goods, and cargo being moved inter-island on a regular* basis. Focus on one set of goods at a time. Record the name of the supplier, a brief description of the goods, and any issues with cleanliness, quality of packaging, or invasive species risks found. Provide feedback to the supplier and support them with improving their biosecurity practices if required.
 - c. Unless you are confident around livestock, it is best to leave biosecurity checks to the person responsible for them, overseeing the process if required.
 - d. Encourage transport operators to carry out regular self-checks of their biosecurity processes using the Checklist for transport operators (Section 4.5).

*Note: 'regular' will be as often as the local situation allows.

2.3 Create and share your list of priority invasive species

Objective

- **To identify priority invasive species that are likely to negatively affect biodiversity, health, or socio-economic values if moved between islands within a country or territory.**

It is important to identify the invasive species that may become, if spread between islands, a threat to livelihoods, health, or biodiversity. An invasive species list will raise awareness of the threat and help communities with identification. The exact list of priority invasive species will be unique to a location.



Key messages

- A clear and concise list with photos will make it easier for the public to identify priority invasive species.
- The list can be used to enhance biosecurity awareness among inter-island stakeholders.
- The list should be updated as new priority invasive species threats are identified.



The macaque monkey is a priority invasive species on Angaur Island, Palau. They damage the native environment and crops, and can carry human diseases. *Photo: S. Shankar, CC BY 2.0*



Poster displaying unwanted invasive species for Bélep Island, New Caledonia.

Recommended actions

1. Work with experts in your region to identify invasive species that are present but restricted in distribution, and also species that pose a risk to your country. Invasive species include animal and plant species, as well as pathogens (bacteria, fungi, or viruses that cause disease in humans, native animals, and plants).

Resources

The National Invasive Species Coordinator

The Pacific Regional Invasive Species Management Support Service (email prismss@sprep.org)

The Global Register of Introduced and Invasive Species

The Pacific Islands Pest List Database

The Pacific Invasive Ant Toolkit

NOTE: Although rodents are already present on many islands in the Pacific, and they may be free of diseases such as *Yersinia* (plague), *leptospirosis*, and *typhus*, these diseases can be spread by new rodent arrivals and passed on to people with negative effects on health. Rodents should be included as a priority invasive species in every Pacific country.

2. Use the information you have gathered to create a list that is brief and easy to understand. Focus on the priority invasive species for your country (those that will have the most negative impact if moved between islands).
3. Identify the biosecurity pathways for each species in your list. You can do this using an invasive species database such as the compendium in [CABI](#) (search for the species and click on the link to pathway vectors). Seek expert advice if you identify pathways that are not covered in this document.
4. Include images and descriptions for each invasive species. This will make them easier for the public to identify. There are useful resources on the internet such as the [global invasive species database](#) or [CABI](#). It may be useful to present the invasive species list as a poster.
5. Use the priority invasive species list to raise awareness among inter-island stakeholders of invasive species that they are likely to find or encounter.
6. Clearly identify any pathogens on your invasive species list and the islands where they are present. Ensure that the stakeholders who more likely to transfer these learn about and follow the process in the Pathogen cleaning checklist (Section 4.4).
7. Update your priority invasive species list with new species as they are identified. Review the full list at least every three years.

Excerpt of a priority invasive species list based off a comprehensive list of priority invasive species that posed a threat to Ouvea from Greater New Caledonia in 2016.

Group	Common name	Species name	Islands where present	Risk pathways	Impacts
Vertebrate	Black rat, ship rat	<i>Rattus rattus</i>	Grande-Terre, Lifou, Isle of Pines	Spread along human-assisted pathways such as in cargo and on boats.	Highly invasive. Significant threat to the Ouvea parakeet and other birds, reptiles, molluscs, and amphibians. Pest of crops and food stores. Vector of human diseases.
Vertebrate	Red vented bulbul	<i>Pycnonotus cafer</i>	Grande-Terre (extreme south-west)	Risk of nesting or roosting birds on sea vessels from originating ports in New Caledonia.	Highly invasive. Bulbuls damage fruit, flowers, seeds, and vegetable crops. They are aggressive to other bird species and spread weed seeds.
Vertebrate	European rabbit	<i>Oryctolagus cuniculus</i>	Grande-Terre, several islets	Risk of deliberate introduction or escape from cages.	Impact on vegetation and soil erosion.
Invertebrate	Flatworm	<i>Platydemus manokwari</i>	Grande-Terre, Mare	Risk of unintentional introduction in soil and potted nursery plants.	Significant threat to endemic and indigenous molluscs (snails and slugs).
Invertebrate	Queensland fruit fly	<i>Bactrocera tryoni</i>	Grande-Terre	Long distance spread of fruit flies is generally human-assisted by transporting infested fruit in freight and hand luggage.	Fruit fly is an economically damaging fruit crop pest and can have significant impact on home grown fruit.
Pathogen	Banana bunchy top virus	<i>Babuvirus</i> spp. Family: Nanoviridae.	Grande-Terre, Lifou	This disease is spread plant-to-plant by aphids and by movement of infected plant material.	Banana production can be seriously impacted by this disease.
Plant	Rose apple	<i>Syzygium jambos</i>	Grande-Terre, Lifou, Mare	Movement of fruit and seeds transported in dirt and compost. Also seeds carried by rats.	A small tree which forms dense thickets. Can shade out native plants and cause soil erosion.

2.4 Create a biosecurity area

Objective

- **To establish a clean and uncluttered biosecurity area and ensure the area is used according to correct biosecurity protocols.**

A biosecurity area is a clean space with a hard surface, that is free of invasive species. People can check, clean, and if necessary, store goods in the area. They are usually located at points of departure and arrival, but it is also recommended that suppliers dedicate a section of their premises to the biosecurity process.

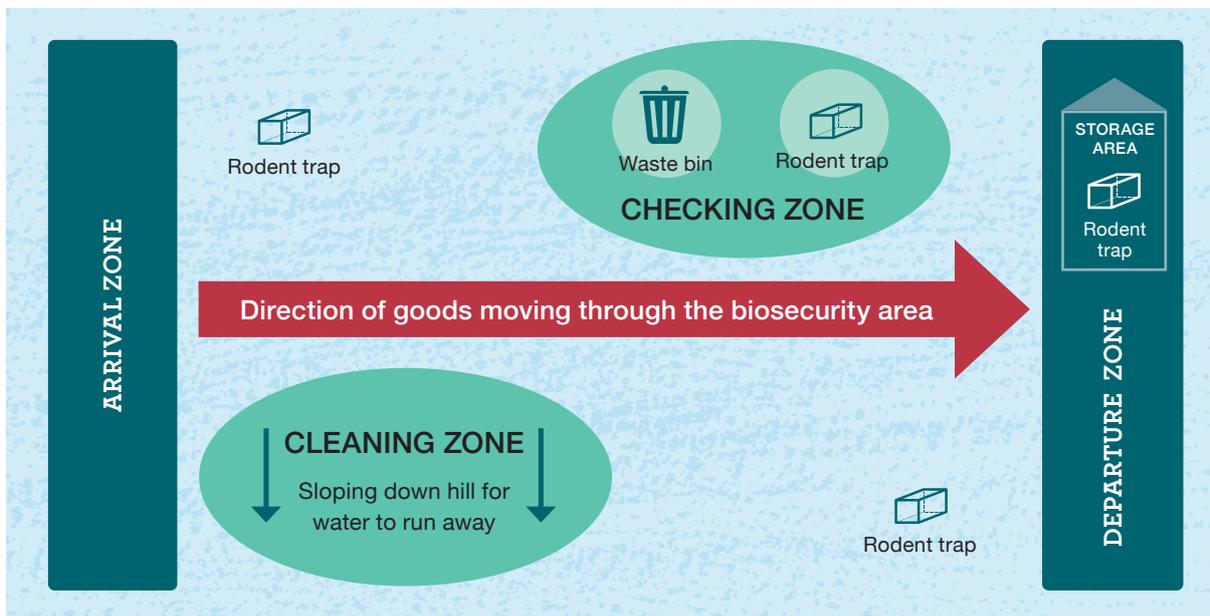
- The best option for a biosecurity area is a sealable building (or dedicated rooms in a building) to enable the most effective prevention.
- If there is no sealable building or room, use a dedicated outdoors area. The minimum standard is a bare, clean, hard surface (concrete, tarseal, or compacted gravel) at least 15 m away from any places that invasive species might hide, such as vegetation, rubbish, timber piles, or general clutter.



Key messages

- The biosecurity area is prioritised for biosecurity purposes.
- The flow of people and freight through the biosecurity area occurs in one direction only. All users are aware of the one-way flow and the reasons for it.
- There are clearly identified separate zones for items that haven't been checked, items that are being checked, and cleared, clean items.
- The biosecurity area is kept clean, tidy, and uncluttered.
- Animal control devices are kept in good condition and are checked regularly to ensure they work.
- Outside the biosecurity area, invasive animal and plant species are managed to reduce the risk of them entering the biosecurity area.

RECOMMENDED LAYOUT OF A BIOSECURITY AREA



Recommended layout of a biosecurity area including the direction of a one-way flow of goods and people.

Recommended actions

1. Identify who you will work with to create (or enhance) a biosecurity area. Departure and arrival points on an island (ports and airports) must have a biosecurity area. Suppliers who are sending or receiving goods (including plants, produce, vehicles, and timber) should have some form of biosecurity area.



An example of a biosecurity area that is easy to keep clean.
Photo: V. Frank (DOC)

2. The biosecurity area should be suitable for the volume, frequency, and type of goods being moved. It should be close to departure/arrival points, easy to keep clean, and large enough to create separate zones for different stages of the checking and cleaning process.
3. Keep the biosecurity area closed and locked (if a building) when not in use to minimise the risk of invasive species entering the facility.
4. If practical, install biosecurity signs at entrances to the biosecurity area. The signs should state 'Biosecurity Area – Entry Only' or 'Biosecurity Area – Exit Only'. Signage shows people that you take biosecurity seriously and encourages others to do the same. It also makes users aware of the one-way movement through the area.
5. Work with the local community to identify which invasive species could potentially infest the biosecurity area. Decide how to prevent contamination with a combination of cleaning, animal control tools, weed control, and physical barriers. Refer to Control tools for invasive species (Section 4.3).
6. If the biosecurity area is a building, ensure:
 - heavy items (such as shelving, benches) are on wheels to facilitate cleaning;
 - doors and windows seal completely when closed;
 - ventilation openings are covered by fine mesh; and
 - there are no unsealed gaps in interior linings.
7. Maintain a cleaning and drying zone within the biosecurity area. If possible, provide and maintain tools and supplies for cleaning and disinfection. Decide on a suite of tools that takes into consideration the invasive species list and the type of goods being moved. Tools and supplies could include:
 - vacuum cleaner or broom and dustpan
 - water blaster or high-pressure hose
 - scrubbing brushes
 - high power torches
 - clean rags
 - disinfectant or dishwashing liquid
 - hot and cold running water
 - plastic spray bottles (clearly labelled for 'diluted disinfectant')
 - pallets compliant with [ISPM 15](#) (an international standard for wood packaging) or shelving to keep clean items off the ground
 - aerosol cans of insecticide
 - sealed rubbish bins.
8. Schedule regular cleaning appropriate to the invasive species risk, volume of goods, and frequency of use. This includes:
 - removing rubbish and unnecessary objects to minimise hiding places for invasive species, sweeping the floor, cleaning up spills immediately, and emptying vacuum cleaner bags after use; and
 - keeping an outdoor biosecurity area free of vegetation to within 15m of its boundary.

9. Set up the biosecurity area to have one-way flow that is clear to everyone. This reduces the risk of cross-contamination from dirty/unchecked items. Clearly mark out separate zones for cleaning, inspecting, and storing clean goods.
10. If goods are suspected to carry a pathogen or if a pathogen has been identified as a risk for a particular island, cleaning should be complemented with the use of disinfectant to kill pathogens. Refer to Pathogen cleaning checklist (Section 4.4).



A storage facility within a biosecurity area should be clean and uncluttered, and only used for cleaned and checked goods. This facility requires improvement. *Photo: V. Frank (DOC)*

CASE STUDY

Stowaway ship rats on boats in French Polynesia

'Ship' rats are known for being excellent stowaways on boats. Once established on a new island, introduced rats can have severe negative impacts on native species, crops, and agriculture.

In French Polynesia, ship rats stowed away in boats travelling from Tahiti to Ua Pou of the Marquesas Islands. They caused the disappearance of the native pihiti (ultramarine lorikeet) and the Ua Pou monarch. They also negatively affect the copra industry and fruit-trees, and are pests in houses.



Ship Rat. *Photo: Jans Canon, CC BY 2.0*

Also in French Polynesia, Tetiaroa Atoll has been battling an outbreak of ship rats that stowed away on boats in the 1970s. The rat population, which also includes the Pacific rat, was estimated as high as 65,000 on Tetiaroa in 2021. The rats are a major threat to four threatened bird species and also green sea turtles who nest on the atoll. Efforts are being made to protect the local wildlife with a rodent eradication programme.

2.5 Prevention on arrival at the destination island

Objective

- **To find and remove invasive species that were not detected during pre-departure inspections or became stowaways during transit.**

Biosecurity measures are required immediately on arrival at the destination island to intercept any invasive species that may have evaded the pre-border prevention measures.



Key messages

- All people, goods, and equipment should be checked for stowaways in a biosecurity area immediately upon arrival on the island, regardless of length of stay.
- If this is not possible, a self-check should be carried out in an enclosed space as soon as possible.
- All invasive species and incursions found are reported to the relevant local authority.

Recommended actions

1. Work with the local authority to appoint an experienced person to oversee all biosecurity activities on arrival, including during unloading of shipping containers and non-containerised goods. This person should consider the key messages and undertake the recommended actions.
2. Work with transport operators to remind travellers prior to disembarking of the importance of carrying out a final check and how to go about doing it. Refer to the template for travellers and their personal items (Section 3.10).
3. Work with port authorities (or whoever is responsible) to check shipping containers. Refer to the template for the use of shipping containers (Section 3.6) for instructions on opening them.
4. Recommend to port and airport authorities that they use the Invasive species interception template (Section 4.6) for any invasive species found. If an invasive species is running/flying free within the biosecurity area, cease all activities and attempt to keep the invasive species contained. Refer to Section 4.3.3 for guidance on humanely killing a live animal. If an invasive species escapes the inspection area at arrivals, ensure that the relevant biosecurity authority is advised immediately.



Arrival areas on an island include private jetties, international ports, and beaches, such as this one on Tenarunga Ateon Atoll in French Polynesia. *Photo: Alain Petit*

CASE STUDY

Stowaways on nursery plants in New Caledonia

Two invasive species are suspected to have spread between islands in New Caledonia by stowing away on nursery plants.

In the 1960s, the little fire ant was accidentally introduced to Grande Terre, the main island of New Caledonia. It rapidly spread to all peripheral islands. Little fire ants kill native invertebrates and lizards, and their sting can cause blindness in domestic cats and dogs. Workers harvesting crops on ant-infested farms receive painful stings and sometimes allergic reactions.



Little fire ants. Photo: (Bob) Ricardo Solar, CC BY-NC-SA 2.0

The giant African snail also spread as a stowaway on nursery plants being transported between islands. It only takes one fertilised giant African snail or eggs in soil to create a founding population.

As well as severely damaging agriculture crops, the snail poses a serious health risk to humans as it carries a parasite known to cause meningitis.



Giant African snail. Photo: Scot Nelson, public domain



3. BIOSECURITY GUIDANCE FOR INTER-ISLAND STAKEHOLDERS

Objective

- **To assist stakeholders in reducing the risk of moving invasive species via inter-island biosecurity pathways by adapting the relevant guidance template.**

Every prevention measure undertaken reduces the risk of spreading invasive species. Implementing the full suite of biosecurity measures along each biosecurity pathway is the goal, but initially this may not be feasible. Focus on achievable goals.

This section includes biosecurity pathway templates that can be adapted for stakeholders. Complete the recommended actions below.

Recommended actions

1. Become proficient with the information in the templates.
2. Complete the section at the beginning of the templates that requires local information.
 - List three priority invasive species relevant to the pathway and local situation.
 - Name the local authority to contact if a possible new invasive species is spotted.
 - Name the local authority who can provide biosecurity advice and guidance.
3. Work through the relevant guidance template with the stakeholder.
 - Discuss their available resources (staff, equipment, and budget), assess their willingness to change/improve their biosecurity practices.
 - Ideally implementing all biosecurity measures would be achievable but if not, highlight the biosecurity measures in the template that are currently feasible for the stakeholder. Revise annually as stakeholder capability/capacity changes.

4. Email or print hard copies of the completed template and relevant supporting material and share with the stakeholder. Keep a copy for your own records.

NOTE: The template for travellers is an exception. The thousands of users of this pathway make this template more challenging to share. Use the template to build awareness in communities and share it at community meetings or other occasions.

Supporting material

For all biosecurity pathways:

- Email or hand-out your priority invasive species list (Section 2.3) to stakeholders. Recommend that they share this list with all employees and users of their services.
- Ensure that the stakeholders likely to transfer any pathogens on your priority invasive species list follow the process in the pathogen cleaning checklist (Section 4.4).
- Assist stakeholders in the appropriate use of animal control devices throughout their premises, on transportation, and in storage facilities. Make them aware of the instructions on how to humanely kill a live captured animal. Refer to the Control tools for invasive species information sheet (Section 4.3).

For the transport management pathway:

- Encourage vessel and aircraft operators to share the pre-departure biosecurity information for travellers on their website, at the time of booking, and at departure points (Sections 4.1 and 4.2).
- Encourage transport operators to carry out regular self-checks of their biosecurity processes (Section 4.5).
- Use the information sheet (Section 4.7) to make conservation or scientific authorities aware of the biosecurity prevention process for wildlife transfers between islands in the Pacific region.

Health and safety

It is important for you and stakeholders to consider health and safety in the use of animal control devices, including handling toxic bait, weed sprays, disinfectants, and tools/equipment used for packaging and cleaning purposes. Always read the product label and follow their safety guidelines.

- The information sheet Control tools for invasive animal species (Section 4.3) includes links to video clips describing how to safely set traps.
- Refer to the Battler Series guide [Use anticoagulant rodent bait safely](#) for safety information on handling toxic bait.

CASE STUDY



Taro leaf vine. Photo: Forest and Kim Starr, CC BY 2.0

Taro leaf vine accidentally moved by travellers

Taro leaf vine has become invasive in many countries and territories in the Pacific. It smothers and kills its host tree. Taro leaf vine grows readily from tiny fragments, making large infestations very hard to control.

In Niue, the taro leaf vine was brought into the country by unsuspecting people who wanted them as ornamental plants for their gardens. The concern is that the vine will spread into Niue's largest rainforest, Huvalu, where it would displace the native flora.

NOTE: If you have questions or want further advice, contact [PRISMSS | Pacific Environment \(sprep.org\)](#).

3.1 Template for ports and marinas

GUIDE FOR PORT AND MARINA OPERATORS

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

-
-
-

If you observe a species that you have never seen before, inform the local authority:



Place all items to be loaded onto departing vessels on clean, hard surfaces such as concrete. *Photo: T. Withers*

For biosecurity advice please contact:

Ports and marinas are known arrival points and host sites for invasive species. You can reduce the chance of invasive species stowing away on boats and cargo by applying the following guidance.

HOW YOU CAN HELP

- Assign an experienced person in your team to oversee biosecurity practices.
- Integrate the information in this guide into your day-to-day operations. Include training for staff.



DID YOU KNOW?
Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. CHECK

- Control rodents and insects in and around the port and marina area with traps, bait stations, mesh insect screens, and insecticides. Check and re-bait traps and bait stations regularly.
- Control weeds in and around the port and marina area. Safely apply herbicide or hand pull weeds – ideally before they seed – and check for new weeds regularly.
- Remain vigilant. If the population of an invasive species is high or increasing, intensify your control efforts.

2. CLEAN

- Keep grass short or replace with concrete, tar seal, or compacted gravel.
- Provide bins with tight-fitting lids for all waste items. Empty regularly. Material such as food and wrappers are a food source for rodents, invertebrates, reptiles, and birds.
- Place all items to be loaded onto departing vessels on clean, hard surfaces (e.g. concrete, tar seal or compacted gravel), at least 15 m away from any vegetation or soil.

Unnecessary clutter and rubbish such as the old pallets in this pile provide hiding places for invasive animals. ►

Photo: V. Frank (DOC)



3. STORE

- Store cargo off the ground, with animal control devices such as traps and bait stations in place.
- Sealable, clean storage units are best, e.g. shipping containers or dedicated storage rooms.
- To prevent contamination by invasive insects, safely spray the inside of storage units with an insecticide. Keep the units sealed until departing cargo is transported to the destination island.
- Restrict access to storage units to reduce the risk of invasive species entering the units when they're opened.

With every turn of the tide, look around us, at this plentiful way of life. These islands are all that we have, and they are vulnerable to invasive species. We must guard them as if our lives depend on it – because it does.



Rarotonga. Photo: K. Steffens (DOC)

3.2 Template for movement of general goods

GUIDE FOR SUPPLIERS OF GENERAL GOODS

General goods carried as freight include packaged goods, household goods such as furniture and appliances, tools, and small machinery and equipment.

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

-
-
-

Invasive species can be crafty stowaways who find hidden crevices in goods and holes in damaged packaging. Insects can hide in boxes and weeds; seeds and dirt can cling to the outside of packaging.

If you observe a species that you have never seen before, inform the local authority:

For biosecurity advice please contact:

The movement of goods between islands can aid the spread of invasive species. You can help reduce this threat by applying the following guidance.

HOW YOU CAN HELP

- Assign an experienced person in your team to oversee biosecurity practices.
- Set up an area at your premises for checking, cleaning, and packing goods. This area needs to have a hard surface, with no rubbish or vegetation nearby.
- Goods may be inspected at the point of departure by biosecurity staff.





DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. CHECK

- Control rodents and insects in and around the premises, e.g. with traps, bait stations, mesh insect screens, and insecticides.
- Before goods leave your premises, check for invasive species. Remove any that you find.
- To make it easier to check goods:
 - Use a torch to light up small crevices and dark areas to check for hidden animals.
 - Tap solid objects with something hard, or shake them, to disturb hidden animals.
 - Have control tools, such as insecticide sprays and a fine mesh hand-net, ready in case you find something.

2. CLEAN

- Brush or wipe away dirt or other contamination (e.g. spiderwebs, leaf litter, seeds) to help remove invasive species that are hard to see, such as insect eggs. Use a high-pressure hose on particularly dirty goods.
- Dismantle goods if necessary to clean hard-to-reach places.
- Clean any packaging you're going to use.

3. PACK

- If using cardboard boxes, only use undamaged ones. Intact cartons made of solid material (treated wood, metal, reusable plastic) are a better option.
- Use shredded paper instead of plant material for cushioning.
- Once goods are packed, seal them firmly with packing tape. Make sure all gaps are covered.
- Keep packed goods off the ground on benches or clean pallets.
- If cartons are bulk-packed on wooden pallets, ensure pallets comply with the International Standards for Phytosanitary Measures No. 15 (ISPM 15).
- Re-check packaged goods just before departure to the destination island. Look for signs of rodent damage and other signs of invasive species. Open any damaged packages and check the contents again before repacking them.

4. STORE

- Store packaged goods off the ground, with animal control devices such as traps and bait stations in place.
- Sealable, clean storage units are best, e.g. shipping containers or dedicated storage rooms.
- To prevent contamination by invasive insects, spray the inside of storage units with an insecticide. Keep the units sealed until the goods are transported to the destination island.

These goods need to be properly cleaned and re-packaged, and clutter reduced to minimise hiding places for invasive species. *Photo: V. Frank (DOC)* ►



3.3 Template for movement of over-sized goods

GUIDE FOR SUPPLIERS OF OVER-SIZED GOODS

Over-sized goods include heavy or non-portable machinery, commercial vehicles, and structures such as water tanks.

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

-
-
-

Invasive species can be crafty stowaways who find hidden crevices in machinery and underneath vehicles. Diseases and insects can hide in mud on tyres; and larger species like snakes, rodents and mongoose can hide inside structures and vehicles.



Check underneath vehicles for stowaways. Photo: DAVAR-SIVAP

If you observe a species that you have never seen before, inform the local authority:

For biosecurity advice please contact:

The movement of over-sized goods between islands can aid the spread of invasive species. You can help reduce this threat by applying the following guidance.

HOW YOU CAN HELP

- Assign an experienced person in your team to oversee biosecurity practices.
- Include effective checking, cleaning, and storage of over-sized goods into your business operations. Provide training for staff.
- Set up a clean area at your premises for checking and cleaning over-sized goods. This area needs to have a hard surface with no rubbish or vegetation nearby.



DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. CHECK

- Control rodents and insects in and around the checking area, e.g. with traps, bait stations, mesh insect screens and insecticides.
- Before goods leave your premises, check for invasive species. Remove any that you find.
- To make it easier to check goods:
 - Use a torch to light up small crevices and dark areas to check for hidden animals.
 - Tap solid objects with something hard, or shake them, to disturb hidden animals.
 - Have control tools, such as insecticide sprays and a fine mesh hand-net, ready in case you find something.
- Make sure all windows and doors on machinery, vehicles, and appliances are firmly closed once they've been checked and found free of contaminants.

2. CLEAN

- Brush or wipe away dirt or other contamination (e.g. spiderwebs, leaf litter, seeds) to help remove invasive species that are hard to see, such as insect eggs, disease-carrying pathogens, and weed seeds.
- Clean goods on a hard surface and dismantle them if necessary to clean hard-to-reach places.
- Use a stiff brush and/or a water blaster to remove all dirt and organic matter off exterior surfaces. Sweep, wipe, or vacuum interior compartments.
- Safely spray an insecticide (follow the product label) into enclosed spaces such as vehicle interiors, keep them sealed for at least one hour, then vent them before use.
- Hoist and chock heavy machinery, or drive it over a pit, to clean the underside. This should only be carried out by a skilled operator.

3. STORE

- If over-sized goods must be stored, ideally use clean and sealable storage units, such as intact shipping containers or large purpose-built storage facilities.
- To prevent contamination by invasive insects, safely use an insecticide on the inside of storage units (only if they do not contain food goods). Keep the units sealed until the goods are transported to the destination island.
- Restrict access to storage units to reduce the risk of invasive species entering when they're opened.
- If machinery and vehicles must be stored outside, keep them on a hard surface that is clean (avoid grass if possible) and remove nearby weeds. Cover with a tarpaulin to help reduce recontamination.
- Install and maintain control devices (e.g. traps, bait stations, mesh insect screens, and insecticides) for invasive species in and around the storage area.

With every turn of the tide, look around us, at this plentiful way of life. These islands are all that we have, and they are vulnerable to invasive species. We must guard them as if our lives depend on it – because it does.



Rarotonga. Photo: K. Steffens (DOC)

3.4 Template for movement of loose bulk material

GUIDE FOR SUPPLIERS OF LOOSE BULK MATERIAL

Loose bulk material includes construction aggregate such as sand, gravel, crushed stone, and slag, as well as copra, wood chips and bark.

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

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If you observe a species that you have never seen before, inform the local authority:

For biosecurity advice please contact:

The movement of loose bulk material between islands can aid the spread of invasive species. You can help reduce this threat by applying the following guidance.

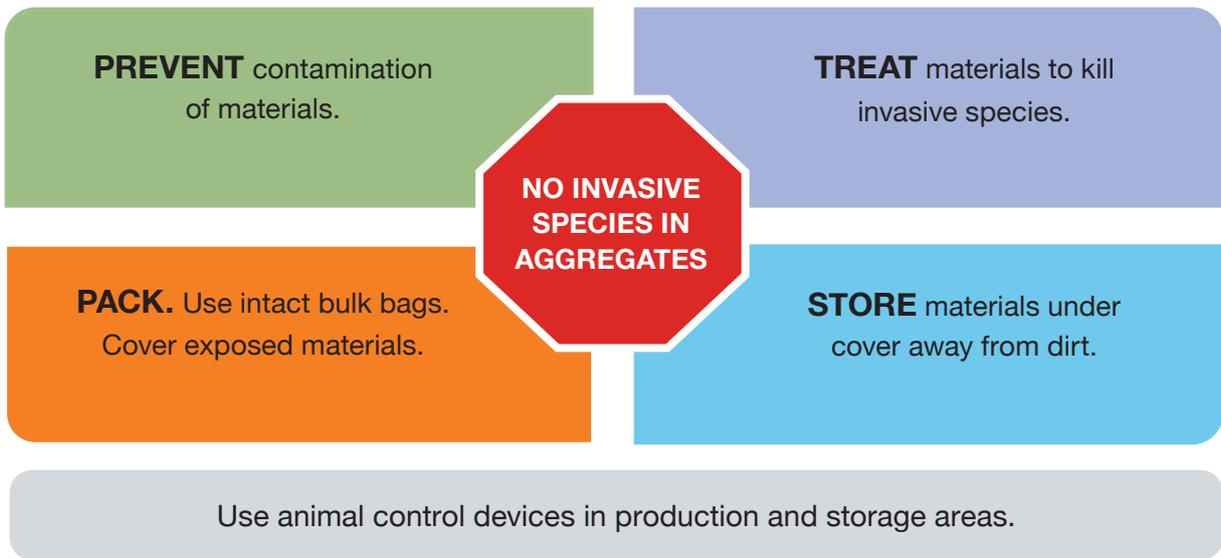


Cover loose materials with a tarpaulin to prevent contamination. *Photo: Lignovis GmbH, CC BY-SA 4.0*

Invasive species can be crafty stowaways who find hidden crevices in aggregates and transport vehicles. Plant diseases, weeds, insects, and larger species like snails, rodents, and lizards can hide in gravel or bark.

HOW YOU CAN HELP

- Assign an experienced person in your team to oversee biosecurity practices.
- Include effective processes for treating, packing, and storing of bulk loose materials into your business operations. Provide training for staff.



DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. PREVENT

- It is very difficult to clean loose materials in bulk, so preventing invasive species from contaminating them in the first place is the best approach.
- Manage invasive species at the source and loading sites (e.g. quarry, forest, sawmill) and prevent contamination during transport.
 - Check that transport trucks are free of invasive species (e.g. rodents, insects) before being used.
 - Maintain animal control devices in production areas.
 - Time production and delivery so that freshly produced materials are loaded onto transport vehicles/vessels without being set down on the ground or put into storage.

2. TREAT

- Treatments can remove/kill some contaminants.
 - Fumigation (by a professional) can kill many invasive species such as insects. However, it may not kill species such as weed seeds, which is why preventing contamination is best.
 - Treating or transporting heavy aggregates in a clean, rotating concrete-mixer truck can kill many invasive animal species.
- Treated materials should be shipped as soon as possible following treatment to minimise the risk of recontamination.

3. PACK

- Bulk bags should be undamaged, clean, and free of contamination such as spiderwebs, leaf litter, and seeds.
- Loose materials should be entirely covered by clean, intact tarpaulins during transport.
- Keep packing areas clean from rubbish, food scraps, and dirt.

4. STORE

- Keep packed bulk bags off the ground, e.g. on benches or on clean pallets.
- Avoid storing materials near dirt. Store them in a fully enclosed area or cover with tarpaulins.
- Install and maintain control devices (e.g. traps, bait stations, mesh insect screens, and insecticides) for invasive species in and around the storage area.

With every turn of the tide, look around us, at this plentiful way of life. These islands are all that we have, and they are vulnerable to invasive species. We must guard them as if our lives depend on it – because it does.



Rarotonga. Photo: K. Steffens (DOC)

3.5 Template for movement of construction materials

GUIDE FOR SUPPLIERS OF CONSTRUCTION MATERIAL

Construction materials includes timber, scaffolding, pipes, fencing, and roofing material.

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

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-
-

If you observe a species that you have never seen before, inform the local authority:

For biosecurity advice please contact:

The movement of construction materials between islands can aid the spread of invasive species. You can help reduce this threat by applying the following guidance.



Drainage pipes. Photo: paulbr75, Pixabay

Invasive species can be crafty stowaways who find hidden crevices in construction materials. Snails, weeds, insects, and larger species like rodents and lizards can hide inside pipes or on roofing material.

HOW YOU CAN HELP

- Assign an experienced person in your team to oversee biosecurity practices.
- Include effective processes for checking, cleaning, and storing construction materials into your business operations. Provide training for staff.
- Set up an area at your premises for checking and cleaning construction materials.



Use animal control devices in production and storage areas.



DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. CHECK

- Before construction materials are bundled and transported to another island, check for invasive species. Remove any that you find. Timber can hide burrowing insects so check carefully.
- If there are large quantities of materials, lifting and jostling them with a forklift can help disturb hidden stowaways.
- To make it easier to check materials:
 - Do checks on a clean, hard surface with no rubbish or vegetation nearby.
 - Control rodents and insects in and around the checking area with traps, bait stations, mesh insect screens, and insecticides.
 - Use a torch to light up small crevices and dark areas to check for hidden animals.
 - Tap solid objects with something hard, or shake them, to disturb hidden animals.
 - Have control tools, such as insecticide sprays and a fine mesh hand-net, ready in case you find something.

2. CLEAN

- Brush or wipe away dirt or other contamination (e.g. spiderwebs, leaf litter, seeds) to help remove invasive species that are hard to see, such as insect eggs. Water-blasting is good for solid surfaces; air-blasting with an air compressor is good for cleaning the inside of pipes, or flush narrow pipes with water.
- If it is manageable, spray the inside of pipes (those not intended for drinking water) with insecticide and seal all ends carefully with tape. Long narrow pipes (often in coils) will be the hardest to clean so use a residual insecticide (such as Termidor) in either end of the pipe to kill insects as they enter/exit.
- Take items or bundles apart to clean hard-to-reach places.
- Treated timber that has come directly from the kiln reduces the risks of introducing unwanted wood-boring insects and tree diseases to other islands.
- Keep clean materials off the ground, e.g. on benches or on clean pallets.

3. PACK

- When being transported, construction materials should be entirely covered by clean tarpaulins, or packed into sealable containers. Cover the open ends of pipes with tape.
- Bundle materials close to the time when they are scheduled for transport to another island.

4. STORE

- Store construction materials off the ground, with animal control devices such as traps and bait stations in place. Sealable, clean storage areas are best.
- To prevent contamination by invasive insects, safely apply an insecticide inside storage units while the stored materials are in them. Keep the units sealed until the materials are transported to the destination island.
- If materials must be stored outside, store them off the ground (e.g. on pallets) so they aren't in contact with dirt. Cover with a clean tarpaulin to help reduce recontamination.

3.6 Template for use of shipping containers

GUIDE FOR THE USE OF SHIPPING CONTAINERS

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

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-
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If you observe a species that you have never seen before, inform the local authority:

For biosecurity advice please contact:



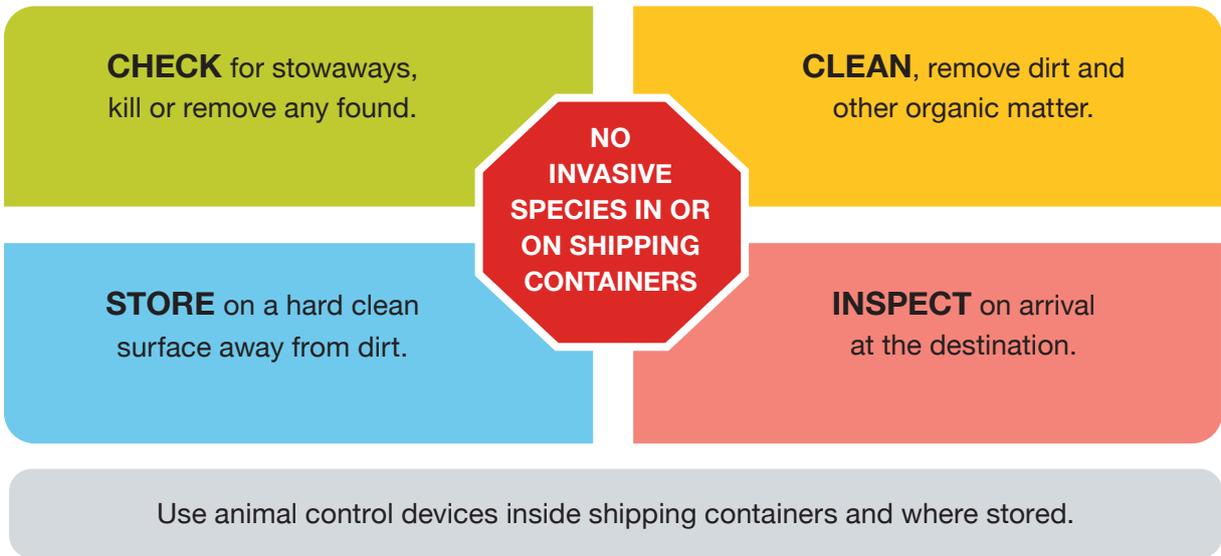
Koné Vavouta Mining Port inspecting a container. Photo: Conservatoire d'espaces Naturels de Nouvelle-Calédonie

The movement of shipping containers between islands can aid the spread of invasive species. Invasive species also hide inside shipping containers being used for storing goods prior to shipping. You can help reduce this threat by applying the following guidance.

Invasive species can be crafty stowaways who find hidden crevices inside and on shipping containers. Snails, weeds, and insects can hide on the underside or inside, and larger species like rodents, snakes, and lizards can hide inside among stored cargo.

HOW YOU CAN HELP

- Assign an experienced person in your team to oversee biosecurity practices.
- Include processes for effective checking, cleaning, and storing shipping containers into your business operations. Provide training for staff.



DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. CHECK

- Make sure the shipping containers are intact (with any holes repaired) and the door seals have no gaps.
 - If it is not possible to repair holes, goods inside must be in sealed packaging or thoroughly cleaned and checked if too large or awkward to package.
 - Unsealed shipping containers should have goods loaded just prior to shipping. Do not store goods in an unsealed shipping container overnight as this will increase the likelihood of invasive species sneaking aboard.
- Before loading goods, carefully check and remove any invasive species you may find.
 - Use a torch to check potential hiding places such as lug holes, locks, and crevices.
 - Check the air intake grille of refrigeration systems for weed seeds.
 - Tap container surfaces with something hard to disturb hidden animals.
 - Have control tools, such as insecticide sprays and a fine mesh hand-net, ready in case you find something.

2. CLEAN

- Use a stiff brush, broom, or vacuum to remove contamination from the inside.
- Use a high-pressure hose or a stiff brush to remove contamination from the outside.
- A good way to kill any hidden insects is to cover air vents and safely spray a pyrethrum-based insecticide inside the empty container, then seal it for at least one hour.

3. STORE

- Store shipping containers away from vegetation on a hard, clean surface such as concrete or compacted gravel.
- Use animal control devices inside containers.
- Keep food separate from other cargo to allow spraying of containers holding non-food cargo with insecticide.
- Once containers are locked, place a seal (e.g. tape, string) to show that the containers have not been opened prior to reaching their destination.
- Do not leave container doors open when unattended.

4. INSPECT

- On arrival at the destination island, inspect containers on a hard surface.
- Before opening containers:
 - Inspect the outside of the container. Kill stowaways and put any contamination found into a bin with a lid until disposal.
 - If the seal on the door is broken be extra alert for stowaways.
- When opening containers:
 - Have control tools, such as insecticide spray and a hand-net, ready in case you find something.
 - Check for stowaways amongst the goods and on interior surfaces. Remove any that you find.

3.7 Template for use of vehicles for transporting goods

GUIDE FOR TRANSPORTERS OF GOODS

Vehicles (mostly commercial vehicles) used for goods transport include trucks, trailers, and vans.

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

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-
-

If you observe a species that you have never seen before, inform the local authority:

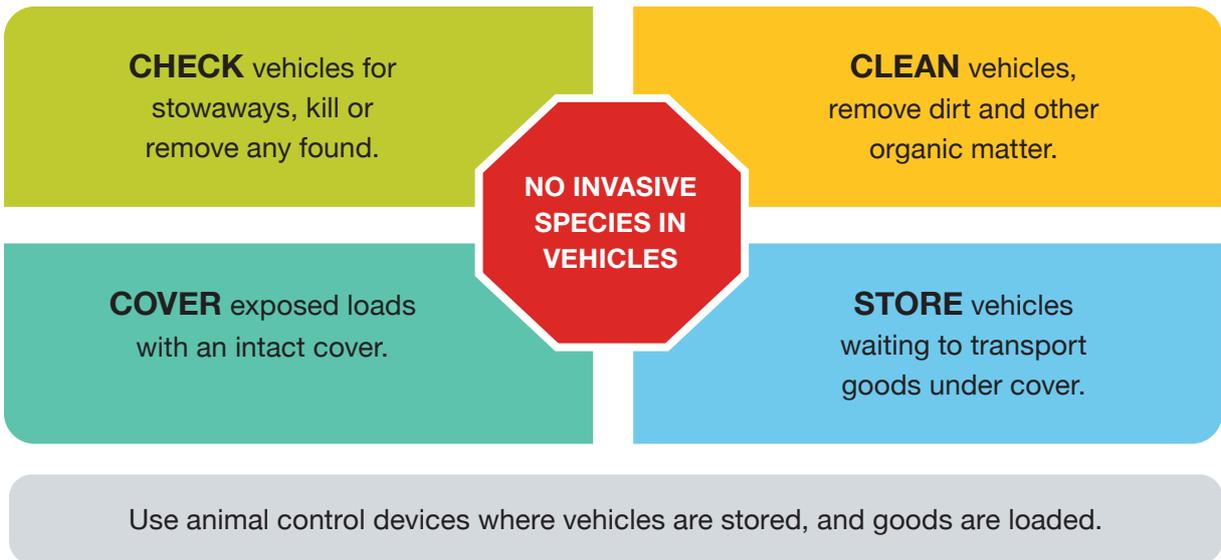
For biosecurity advice please contact:

Invasive species can be crafty stowaways who find hidden crevices inside cabins, engines and around tyres. Pathogens, insects, snails, frogs, lizards, rodents, and weeds can easily go undetected.

The movement of goods between islands can aid the spread of invasive species. Transporting goods from the supplier premises to the departure point, is part of this route. You can help reduce this threat by applying the following guidance

HOW YOU CAN HELP

- Assign an experienced person in your team to oversee biosecurity practices.
- Include effective processes for checking, cleaning, and storing vehicles into your business operations. Provide training for staff.
- Set up a clean area at your premises for checking, cleaning, and storing vehicles. This area needs to have a hard surface with no rubbish or vegetation nearby.





DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. CHECK

- Before using a vehicle to transport goods, check for invasive species. Remove any that you find.
- To make it easier to check:
 - Use a torch to light up small crevices and dark areas to check for hidden animals.
 - Tap solid objects with something hard, or shake them, to disturb hidden animals.
 - Have control tools, such as insecticide sprays and a fine mesh hand-net, ready in case you find something.

2. CLEAN

- If you find any dirt or other contamination (e.g. spiderwebs, leaf litter, seeds) while checking a vehicle, clean it before loading goods.
 - Vacuum or sweep interiors and sweep the back of flat deck trucks.
 - Vacuum foot mats.
 - Hose down and scrub the outside, including the decks of trucks.
 - Pay close attention to potential hiding places, e.g. wheel arches, engines and tight crevices.
- To help prevent goods from being contaminated during transport, don't put them directly on the ground when moving them between vehicles. Alternative options include:
 - Use human chains to pass goods hand-to-hand.
 - Use clean metal trolleys to move goods.
 - Put goods down on a clean, intact tarpaulin and keep watch for invasive animals and seeds.

3. COVER

- Completely cover any goods that are exposed once loaded onto a vehicle with a tarpaulin. This helps prevent contamination by seeds and insects during transport.

4. STORE

- When not in use, park vehicles under cover. An enclosed area like a shed is best.
- If vehicles must be parked outside, park them on a clean hard surface (avoid grass if possible) and remove weeds from the surrounding area.
- Install and maintain control devices (e.g. traps, bait stations, mesh insect screens, and insecticides) for invasive species in and around the parking area.

With every turn of the tide, look around us, at this plentiful way of life. These islands are all that we have, and they are vulnerable to invasive species. We must guard them as if our lives depend on it – because it does.



Rarotonga, Photo by: K. Steffens (DOC)

3.8 Template for use of sea vessels

GUIDE FOR OPERATORS OF SEA VESSELS

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

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-
-

If you observe a species that you have never seen before, inform the local authority:

For biosecurity advice please contact:

The movement of sea vessels (and their cargo) between islands can aid the spread of invasive species. You can help reduce this threat by applying the following guidance.

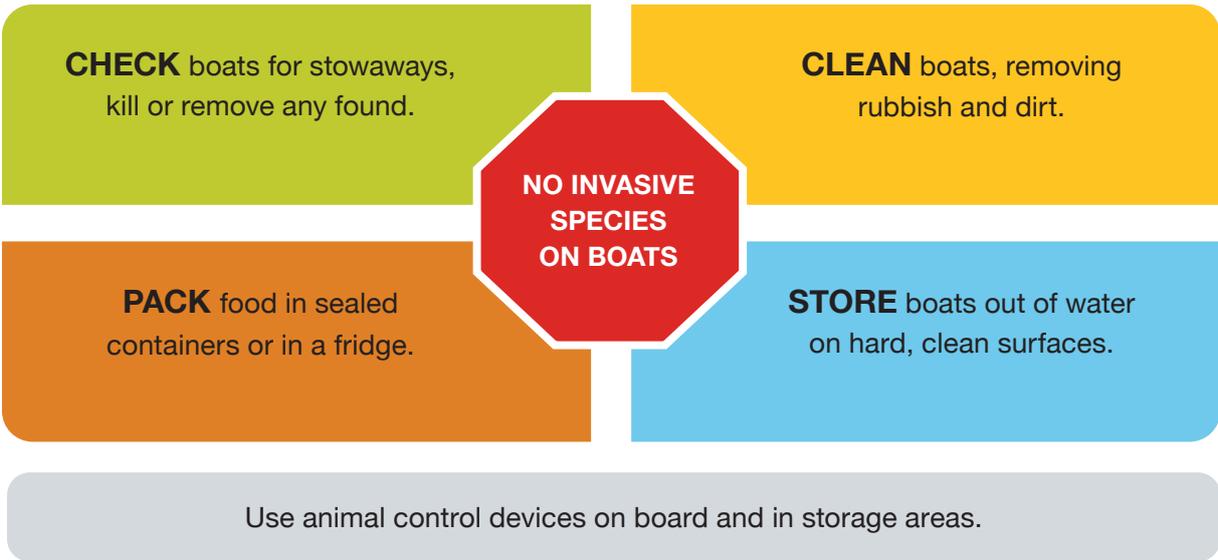


Regularly check boats for stowaways. *Photo: Conservatoire d'espaces naturels de Nouvelle-Calédonie*

Invasive species can be crafty stowaways who find hidden crevices in cabins and holds. Pathogens, insects, snails, frogs, lizards, rodents, and weeds can easily go undetected. Larger boats can conceal larger organisms such as birds (myna and red-vented bulbul), mongoose, rabbits, and snakes.

HOW YOU CAN HELP

- Assign an experienced person in your team to oversee biosecurity practices.
- Include effective processes for checking, cleaning, and storing sea vessels into your business operations. Provide training for staff.
- Give the Pre-departure biosecurity checklist to travellers when they book to travel on your boat.



DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. CHECK

- Before using your boat to transport goods or people to another island, check for invasive species. Remove any that you find.
- Check for rodent signs such as droppings and chew marks (e.g. on stored food and electrical cables).
- To make it easier to check your boat:
 - For smaller boats do checks on an open surface without any rubbish or vegetation nearby. A hard surface such as concrete is ideal, otherwise gravel or sand.
 - Use a torch to light up small crevices and dark areas to check for hidden animals.
 - Tap solid objects with something hard, or shake them, to disturb hidden animals.
 - Have control tools, such as insecticide sprays and a fine mesh hand-net, ready in case you find something.
- Avoid leaving port at night when unwanted stowaways are harder to detect and boat lights attract insects.

2. CLEAN

- Protect your boat by keeping it clean and controlling rodents and insects.
- Recommended animal control tools include:
 - Rodent traps or bait stations in cabins, engine rooms, galleys, food/rubbish storage areas, and areas where island-bound goods are stored.
 - Residual insecticide sprays applied in all holds and areas where goods are stored.
- Check the animal control tools before each trip to another island.
- Remove dirt, rubbish, and food items from your boat before and after each trip. Sweep or vacuum floors and wash or wipe surfaces.

3. PACK

- Pack food and other goods that rodents or insects might eat into sealed containers.
- Seal rubbish and food scraps in plastic bins with tight-fitting lids.

4. STORE

- When a boat is not in use:
 - Keep all doors and compartments closed.
 - Correctly place rodent guards on mooring lines.
 - Withdraw/raise the gangway, especially from dusk to dawn.
- When a boat is out of the water, store it on a hard, clean surface if possible. If storing a vessel on a beach, keep it away from vegetation.
- Maintain weed and invasive animal control in boat storage areas.

IMPORTANT:

If an invasive animal is found on your boat before you arrive at the destination island:

- Kill it immediately if possible and check for more. DO NOT throw it overboard as some invasive species can raft, swim, or float to an island.
- Avoid landing on the destination island until you've killed/captured all stowaways.

3.9 Template for use of aircraft

GUIDE FOR OPERATORS OF AIRCRAFT

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

-
-
-

If you observe a species that you have never seen before, inform the local authority:

For biosecurity advice please contact:

The movement of aircraft (aeroplanes and helicopters) between islands can aid the spread of invasive species. You can help reduce this threat by applying the following guidance.



Use hard surfaces for take-off and landing if possible, such as the area at Nouméa Domestic Airport. Photo: Conservatoire d'espaces naturels de Nouvelle-Calédonie

Invasive species can be crafty stowaways who find hidden crevices in cabins or luggage holds. Pathogens, insects, snails, frogs, lizards, rodents, weeds, birds, and snakes can easily go undetected.

HOW YOU CAN HELP

- Assign an experienced person in your team to oversee biosecurity practices.
- Give the Pre-departure biosecurity checklist to travellers when they book to travel on your aircraft.



Use animal control devices in the hanger and throughout the airport if possible.

DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. CHECK

- Use hard surfaces for take-off and landing sites if possible. A grass take-off/landing site is not ideal, but if used keep grass mown to low levels to prevent seeding. Control weeds at take-off and landing sites and in the surrounding area.
- Before using your aircraft to transport goods or people to another island, check for invasive species. Remove any that you find.
- Pay particular attention to the luggage and cargo hold, skids/landing gear, and to the area below the main cabin floor in helicopters.
- Check for signs of rodents such as droppings and chew marks (e.g. on food or electrical cables).
- To make it easier to check your aircraft:
 - Do checks on a clean, hard surface with no rubbish or vegetation nearby.
 - Use a torch to light up small crevices and dark areas to check for hidden animals.
 - Tap solid objects with something hard, or shake them, to disturb hidden animals.
- Ask your passengers to check their personal belongings for unwanted stowaways.
 - Have control tools, such as insecticide sprays and a fine mesh hand-net, ready in case you find something.

2. CLEAN

- Protect your aircraft by maintaining a high standard of hygiene as part of routine aircraft maintenance.
- Keep aircraft clean inside and out, by vacuuming, sweeping, or washing to remove dirt, food waste, rubbish, and other organic matter such as spiderwebs and leaves.
- Safely apply a long-lasting insecticide (e.g. Ripcord or long-lasting permethrin) inside the flight deck, cabin, and baggage holds.

3. PACK

- Make sure any luggage being loaded into the aircraft is sealed (zipped up, taped, or wrapped in intact packaging).

4. STORE

- When your aircraft is not in use, keep all doors and hatches closed.
- Park it in the hanger or on a hard, weed-free surface such as tarmac.
- Install and maintain invasive animal control devices. Encourage the airport authority to maintain ongoing airport-wide invasive animal control.

IMPORTANT: If an invasive species is found on your aircraft in transit before you arrive at the destination island:

- Kill it immediately if possible (or contain it) and check for more before doors open on arrival.
- Be vigilant while unloading goods and people in case there are more.

With every turn of the tide, look around us, at this plentiful way of life. These islands are all that we have, and they are vulnerable to invasive species. We must guard them as if our lives depend on it – because it does.

3.10 Template for travellers and their personal items

GUIDE FOR TRAVELLERS

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

-
-
-

If you observe a species that you have never seen before, inform the local authority:

For biosecurity advice please contact:



Check luggage for stowaways before boarding inter-island transport. *Photo: Conservatoire d'espaces naturels de Nouvelle-Calédonie*

The movement of travellers and their belongings (including their vehicles and pets) between islands can aid the spread of invasive species. You can help reduce this threat by respecting regulations and applying the following guidance.

Invasive species can be crafty stowaways who find hidden crevices in luggage and holes in damaged packaging. Rodents, insects, lizards, snails, weeds, and pathogens can hide in bags, plants, and on the outside of packaging.

HOW YOU CAN HELP

CHECK belongings for stowaways, remove or kill any found.

CLEAN luggage and footwear, remove dirt and other organic matter.

NO INVASIVE SPECIES ON TRAVELLERS

PACK belongings in suitable, sealable packaging. Food in sealed containers.

RE-CHECK belongings for stowaways on arrival, remove or kill any found.



DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. CHECK

- Check the local regulations regarding the movement of pets, plants, and produce.
- Before travelling to another island, check for invasive species. Remove any that you find.
- To make it easy to check your belongings:
 - Check and pack your luggage in a clean, open area.
 - Use a torch to light up small crevices and dark areas to check for hidden animals.
- Don't take food that is contaminated by insects such as weevils and moths in cereals or biscuits, or ants in honey or fruit.
- Check cut flowers including flower crowns and leis for invasive species or signs of disease. Do not transfer diseased flowers or flowers that are from an invasive weed.
- Have control tools, such as insecticide sprays and a fine mesh hand-net, ready in case you find something.

2. CLEAN

- Clean the bags or containers you're going to pack things into, both inside and out, to ensure they are free of contamination. Make sure they don't have any holes that could let in stowaways. Reusable plastic containers are a better choice than cardboard boxes.
- Make sure your clothing and footwear are clean, including shoe soles, velcro, and pockets.
- Any pets travelling with you must be clean, healthy, and up-to-date with worm, flea and lice treatments, and vaccinations.
- Wash and wipe (or scrub) fruit and vegetables to remove dirt, seeds, and invertebrates.

3. PACK

- Pack your clean belongings into clean bags, containers, or suitcases straight after checking them.
- If taking a vehicle, check and clean it before loading your belongings, then load your belongings directly into the vehicle without setting them down on the ground.
- Completely cover belongings in a trailer or on the deck of a ute.
- Put any fresh food and opened packets of food (including pet food) into sealed containers. Taking unopened packets of food is best.
- If cushioning material is required, use shredded paper instead of plant material.
- Close and seal your luggage with zips/tape/other fasteners. Avoid opening it again until you're at the destination island.



Vehicles waiting for loading onto a ferry must be left on a clean, hard surface.
 Photo: Conservatoire d'espaces naturels de Nouvelle-Calédonie

4. RE-CHECK

- Once you've arrived at the destination island, re-check your belongings for any signs of invasive species as you open and unpack them.
- It's best to check your belongings as soon as possible and in a clean area, preferably enclosed. This makes it easier for you to see and catch any stowaways.

3.11 Template for movement of livestock

GUIDE FOR THE TRANSFER OF LIVESTOCK

Livestock includes cattle, horses, goats, deer, pigs, poultry, and sheep.

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

-
-
-

If you observe a species that you have never seen before, inform the local authority:



Pig inspection. Photo: Commander, U.S. 7th Fleet, CC BY-SA 2.0

For biosecurity advice please contact:

The movement of livestock between islands can aid the spread of invasive species. You can help reduce this threat by applying the following guidance.

Invasive species can be crafty stowaways who hide in the coats or on the skin of livestock. Livestock can carry disease such as African swine fever. Weeds, seeds, and dirt can cling to hooves, fleeces, and feathers.

HOW YOU CAN HELP

TREAT. Keep stock up to date with healthcare.

CHECK livestock, kill or remove any stowaways.

**NO
INVASIVE
SPECIES
IN OR ON
LIVESTOCK**

CLEAN. Hose muddy feet.

STORE livestock prior to loading in weed free stockyards.



DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. TREAT

- Keep stock up-to-date with healthcare (de-worming, de-lousing, and vaccinations) to make it easier to avoid taking invasive species such as disease-causing pathogens and parasites to another island.
- Shear/clip sheep and other long-haired livestock shortly before transport to remove dirt, weed seeds, and other organic matter e.g. leaves, spiderwebs.
- Avoid taking hay and silage or other fresh feed to another island, as invasive species can easily hide in it. It is best to use clean packaged pellets if stock must be fed on the way.
- Avoid taking sick livestock to another island.

2. CHECK

- Check livestock just before loading for biosecurity risks (e.g. coats with dirt or seeds; sick animals). Leave any stock of concern behind and remove any invasive species that you find.
- Check the truck or barge for invasive species. Remove any that you find.

3. CLEAN

- Wash/sweep the truck or barge if you find any contamination. This helps remove the invasive species that are harder to see, such as insect eggs and disease-carrying pathogens.
- Hose muddy hooves of stock immediately before loading if possible.

4. STORE

- Move stock into weed-free stockyards with weed-free feed (e.g. commercial stock pellets) at least 24 hours before loading onto transport.

With every turn of the tide, look around us, at this plentiful way of life. These islands are all that we have, and they are vulnerable to invasive species. We must guard them as if our lives depend on it – because it does.



Rarotonga. Photo: K. Steffens (DOC)

3.12 Template for movement of nursery plants

GUIDE FOR SUPPLIERS OF NURSERY PLANTS

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

-
-
-



Greenhouse plants raised at Sonaisali Island Fiji. Photo: peachygreen, CC BY-NC-ND 2.0

If you observe a species that you have never seen before, inform the local authority:

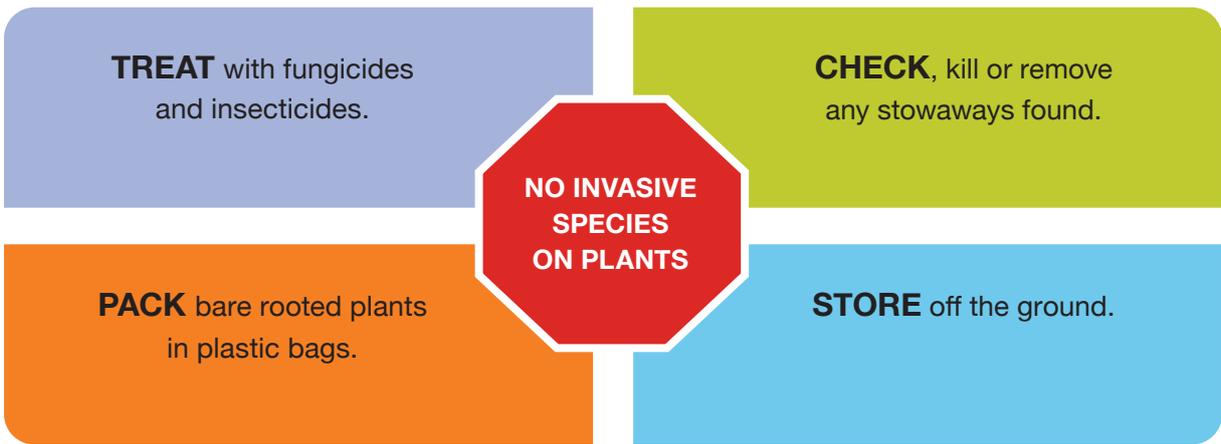
For biosecurity advice please contact:

Invasive species can be crafty stowaways. Disease, ants, snails, mealy bugs, aphids, weeds, and other insects can hide in foliage, the root mass of plants, or in dirt on roots and packaging.

The movement of nursery plants between islands can aid the spread of invasive species. You can help reduce this threat by applying the following guidance.

HOW YOU CAN HELP

- Assign an experienced person in your team to oversee biosecurity practices.



Implement nursery wide animal, weed and pathogen control.



DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. TREAT

- Implementing nursery-wide animal, weed, and pathogen control makes it easier to avoid taking invasive species to another island. Safely use pesticides and/or horticultural oils according to the product labels.
- Keep propagation areas clean and free of diseased or infested plant material.
- Spray plants with a systemic fungicide about six weeks before taking them to another island. Avoid applying fungicides for the final six weeks to enable any remaining disease to develop visible symptoms, and don't take any diseased plants.
- Spray plants with a systemic insecticide about two weeks before taking them to another island.

2. CHECK

- Before transporting plants, check for invasive species. Remove any that you find.
- Avoid taking any unhealthy or suspect plants to another island.
- Check plants again at the destination island before planting them out.
- Have control tools, such as insecticide sprays and a fine mesh hand-net, ready in case you find something.

3. PACK

- When transporting plants, it is best to put whole, bare-rooted plants in clear reusable plastic bags. This helps avoid taking potting mix or soil containing invasive species. Spray the inside of the bag with an insecticide and seal it with cable ties or tape.
- If taking bare-rooted plants isn't possible, remove the top layer of soil of potted plants just before transporting them. Check plants visually and shake them to disturb hidden stowaways.

4. STORE

- Once plants have been checked for stowaways, store them off the ground (e.g. on clean pallets) to minimise recontamination.

With every turn of the tide, look around us, at this plentiful way of life. These islands are all that we have, and they are vulnerable to invasive species. We must guard them as if our lives depend on it – because it does.



Rarotonga. Photo: K. Steffens (DOC)

3.13 Template for movement of produce

GUIDE FOR SUPPLIERS OF PRODUCE

Produce includes vegetables and fruit.

You can help protect our people, our crops, and our islands from the harm done by invasive species and diseases. Three priority invasive species include:

-
-
-



Tropical fruit. Photo: Pexels, Pixabay

If you observe a species that you have never seen before, inform the local authority:

For biosecurity advice please contact:

The movement of produce between islands can aid the spread of invasive species. You can help reduce this threat by applying the following guidance.

Invasive species can be crafty stowaways. Disease, aphids, ants, fruit fly, and weeds can hide on foliage, inside root crops, or in bunches of fruit.

HOW YOU CAN HELP

- Assign an experienced person in your team to oversee biosecurity practices.
- Set up an area at your premises for checking, cleaning, and packing produce. This area needs to have a hard surface with no rubbish or vegetation nearby.



Use animal control devices in checking and storage areas.



DID YOU KNOW?

Rats can squeeze through a 12 mm gap and mice can squeeze through a 7 mm gap!

1. CHECK

- Before your produce leaves your premises, check for invasive species and signs of disease such as unusual discolouration of fruit or leaves on leafy vegetables. Remove any that you find.
- Look carefully because invasive species can hide among the leaves of large, leafy vegetables or in bunches of fruit. Shake these to expose hidden insects.
- Only transport produce that is healthy and clean.
- Have control tools, such as pyrethrum insecticide sprays and a fine mesh hand-net, ready in case you find something.

2. CLEAN

- Brush or wipe away dirt or other contamination (e.g. spiderwebs, leaf litter, seeds) to help remove invasive species that are hard to see, such as insect eggs, disease-carrying pathogens, and weed seeds.

3. PACK

- Minimise the time between packing produce and transporting it.
- Keep the packing area clean from rubbish, food scraps, and dirt.
- If using cardboard boxes or fabric bags, only use undamaged ones. Strong reusable plastic containers are a better option.
- If cushioning material is required, use shredded paper instead of plant material.
- Once produce has been packed, seal packages firmly with packing tape or similar. Make sure all gaps are covered. Keep packages sealed until they've reached the destination island.
- Check packaged produce just before transport for signs of rodent damage and other contamination. Open any damaged packages and check the contents again. Remove any contaminated produce if necessary.

4. STORE

- Store packaged produce off the ground, with animal control devices in place.
- Store inside clean, sealable units, such as shipping containers or dedicated storage rooms.
- Restrict access to storage units to reduce the risk of invasive species entering the units when they are opened.

With every turn of the tide, look around us, at this plentiful way of life. These islands are all that we have, and they are vulnerable to invasive species. We must guard them as if our lives depend on it – because it does.





4. FURTHER RESOURCES

This section includes information sheets and checklists that practitioners can adapt and share with stakeholders to support implementation of inter-island biosecurity measures.



4.1 Checklist: Pre-departure biosecurity for travellers

If printing this checklist, use waterproof paper if possible.

PROTECT OUR ISLANDS – PREVENT THE MOVEMENT OF INVASIVE SPECIES

Travellers and their belongings (including luggage, vehicles, and pets) moving between islands can aid the spread of invasive species. You can help reduce this threat by ensuring your belongings are free of invasive species. Complete this checklist prior to travel.



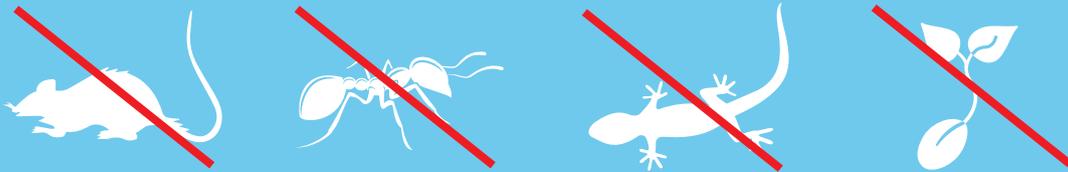
Before Departure, tick YES to the following			Yes
	Bags, suitcases, containers	Is my luggage clean inside and outside, free of dirt and other organic matter? Is it intact with no holes? Is it closed?	<input type="checkbox"/>
	Footwear	Is my footwear clean inside and outside with no visible seeds or dirt?	<input type="checkbox"/>
	Clothing	Is my clothing free of dirt and seeds including pockets, velcro, and seams?	<input type="checkbox"/>
	Food	Are fruit and vegetables clean with no dirt, insects, or snails? Is food in sealed containers?	<input type="checkbox"/>
	Plants	Are plants and cut flowers (including flower crowns and leis) healthy and free of live insects and signs of disease? Are they a non-weed species that is legal to move to the destination island?	<input type="checkbox"/>
	Pets	Is my pet up-to-date with healthcare (vaccinations, worming and flea/lice treatment)? Is my pet healthy and clean (no dirt or weed seeds on coat, feet, or feathers)? Is it legal to move my pet to the destination island?	<input type="checkbox"/>
	Personal vehicle	Is my vehicle clean inside and outside, free of dirt and other organic matter? Are exposed loads on trailers or ute decks completely covered?	<input type="checkbox"/>

If you have questions or want further advice, contact:

4.2 Poster: Pre-departure biosecurity for travellers

HELP PROTECT OUR ISLANDS – prevent the movement of invasive species

Check your belongings for stowaways.



Clean your shoes and belongings.



No holes in luggage. Close them for travel.



4.3 Information sheet: Control tools for invasive animal species

The focus of this document is on the control of invasive invertebrates, small lizards, and rodents as they are widespread across the Pacific and have proven methods of control.

Other invasive animal species will need to be targeted in some countries.

Please consult local experts or contact [PRISMSS | Pacific Environment \(sprep.org\)](#) for advice on appropriate control devices.

4.3.1 Indoor spaces

The following control devices are to be used **inside** biosecurity and storage facilities (enclosed spaces). This includes shipping containers.

Invertebrates

- Methrins (such as Ripcord) are long-lasting insecticide sprays that are applied to surfaces to control crawling insects. Permethrin has the longest residual impact. Always read the product label and follow the instructions to use it safely.
 - Apply around windows, doors, and ventilation points, and along wall/ceiling and wall/floor edges.
 - Apply around the edges and in corners of shipping containers before they are packed.
 - Repeat treatment as per the product label recommendations.
 - Re-apply after cleaning any of the targeted surfaces.
- Pyrethroids can be used as an aerosol spray from a dispenser or a hand-held canister. Always read the product label and follow the instructions to use it safely.
- Sticky traps combine detection and control, and provide evidence if insects enter a storage or a biosecurity facility.
 - Place three or four alongside walls in each room where crawling insects are more likely to encounter them.
 - Check daily if rodents or lizards are likely to be present, otherwise every fortnight, and report any unusual captures.
 - Replace the devices quarterly, or more frequently if the tackiness deteriorates.
 - Sticky traps are inhumane, so it is recommended that they are set so that animals such as rodents can't enter them.

Small lizards

There are no traps specific to small lizards for use inside buildings, but insect sticky traps can be used for this purpose, provided the following animal welfare conditions are met:

- Set three or four insect sticky traps against the walls.
- Check the traps daily, no later than 12 hours after sunrise.
- If the traps cannot be checked daily, they must be closed, for instance by putting a container over them.
- If lizards are caught, identify the species promptly. If the species is unknown, kill the individual and ask an expert to identify it for future reference. Kill any target invasive species and release non-target species using cooking oil. This can be very labour-intensive and may rule out using these devices.
 - Spray a small amount of oil onto the sticky surface of the card, surrounding the tail, feet, legs, and body.
 - Do not spray directly onto the head as it's important to keep airways clear of oil.
 - Allow the oil to soak into the glue for 20-30 seconds, or until you see the lizard starting to struggle and self-release.
 - ALWAYS start with the tail and work towards the head.
 - Use a toothpick or similar, to release the lizard by gently working it into the glue to separate it from the lizard's skin, beginning at the tail end.
 - If the glue remains taut, add more oil, and wait for it to loosen.
 - Once the tail is free, continue with the rear toes and legs, followed by the body and the front toes and legs.
 - Toes are extremely delicate, so saturate them with oil and wait a little longer if they do not separate from the glue easily.
 - Release the head last and transfer the lizard onto tissue paper to absorb all excess oil.

CASE STUDY

Stowaway brown tree snakes in over-sized goods

The brown tree snake probably arrived on Guam in vehicles or other military material transported in the years immediately following World War II. They spread rapidly across the island after 1960.

The snakes, which are mildly venomous, have caused many problems. The island's power system regularly shorts when snakes crawl on the lines (the locals call the power cuts 'brown outs'). They have also had a huge impact on wildlife with ten out of 12 native forest bird species disappearing in 30 years. With fewer birds to eat, the snake switched its diet to lizards and small mammals.

Trained dogs check every single item of cargo before it leaves Guam. Stowaway snakes could have devastating consequences on other island economies and ecosystems.



Brown tree snake. Photo: Pavel Kirillov, CC BY-SA 2.0

Rodents

Use one or more of the following devices to eliminate rodents within enclosed facilities.

TRAPS

Use at least one rat trap and one mouse trap per 50 m² or per room if smaller than 50 m². Bait with peanut butter or small pieces of coconut. If a bycatch of native lizards is high, re-consider trap placement to avoid lizard high-use areas. Check traps on a regular basis, ideally once a week.

Mouse snap traps

- Use a mouse snap trap with sturdy construction – metal is better than plastic. The Victor Easy Set mouse trap is recommended.

Advantages	Disadvantages
<ul style="list-style-type: none"> • Inexpensive and designed to be replaced regularly (every 1-2 years). • Having a body confirms its presence, and that it has been killed. • Doesn't introduce poison into the environment. • Can use in a food storage facility instead of bait stations. 	<ul style="list-style-type: none"> • Non-lethal encounters can create trap-shy individuals. • Can injure or kill non-target native species such as lizards and large invertebrates. • Can only be used to target mice. • The fine metal springs wear out quickly in a coastal environment, so the trap replacement rate is relatively high. Treating the traps with a lanolin-based product prior to first use improves longevity.

Rat snap traps

- Use a rat snap trap with sturdy construction – metal is better than plastic. Victor Professional rat trap is recommended.
- Watch a video clip explaining how to safely set and empty a Victor rat trap [How to set and empty the Victor Rat Trap – YouTube](#).

Advantages	Disadvantages
<ul style="list-style-type: none"> • Effective for trapping rats under 80g. • Having a body confirms its presence, and that it has been killed. • Inexpensive. • Can use in a food storage facility instead of bait stations. • Doesn't introduce poison into the environment. 	<ul style="list-style-type: none"> • Non-lethal encounters can create trap-shy individuals. • Only recommended to target ship rats and Pacific rats, as larger Norway rats can pull free and become trap shy. • Can injure or kill non-target native species such as lizards, large invertebrates, and native birds. • Must be maintained as fine metal parts can rust and wooden bases can rot, causing the trap to lose effectiveness quickly in a coastal environment. Treating the traps with a lanolin-based product prior to first use improves longevity.

BAIT STATIONS

Use at least one bait station per non-food storage facility. Traps are a safer option to use in food storage facilities. Brodifacoum (such as in Pestoff Rodent Block baits) is the preferred toxin to target rats and mice.

4.3.2 Outdoor spaces

The following control methods for invasive animal species (invertebrates, small lizards, rodents) are to be used in **outside** spaces such as a port, airport, or outdoor biosecurity area.

Invertebrates

- Be vigilant for high numbers or wide trails of ants. If you are unsure of the species or believe it is an invasive species, collect some individuals for expert identification.
- It is recommended that you control ants in the immediate vicinity of biosecurity and storage facilities to reduce the risk of them entering the facilities. Ant control can be complex. Treatment options and how to apply them can be found in [Getting rid of ants - Pacific Invasive Ant Toolkit \(piat.org.nz\)](#).

Small lizards

It is difficult to control lizards in outdoor spaces so if they are present in the environment, be extra vigilant when checking vehicles or cargo that have been stored outside. If you are unsure of the species or believe it is an invasive species, catch and collect some individuals for expert identification.

Rodents

Space rat control devices 25m apart in a grid pattern and mouse control devices at 10m spacing around buildings and structures. Ideally place devices in or near green areas, along fences or beside buildings. Place an additional rodent device beside waste bins and in areas where food is handled/consumed.

TRAPS

Use mouse or rat snap traps (refer to the section on controlling rodents in indoor spaces for information on Victor traps). Victor rat traps are not suitable for trapping larger Norway rats. DOC-150 or DOC-200 traps can be used to target Norway rats, as well as the other rat species (but not mice). Traps set outside should be used with a cover. Bait traps with a piece of coconut or a dollop of peanut butter, and check regularly, ideally once a week.

Rat trap DOC 150 or DOC 200 trap

Advantages	Disadvantages
<ul style="list-style-type: none"> • Having a body confirms its presence, and that it has been killed. • Can be used to target all rat species including Norway rats. • The traps will last a long time before needing replacement. • Stainless steel traps are available and are recommended for coastal environments (although they are more expensive). • Doesn't introduce poison into the environment. 	<ul style="list-style-type: none"> • They come pre-set at 100 g trigger weight so will need to be adjusted if used to target smaller rats in the 80-100 g range. Watch a video clip explaining how to adjust the spring off weight of a DOC 200 trap How to properly calibrate the spring off weight of a DOC 200 – YouTube. • Not suitable for animals under 80 g, such as juvenile rats and mice. • Relatively expensive, especially if sourcing from New Zealand.

For a video clip explaining how to safely set a DOC 200 trap, please refer to [Backyard predator free – Trap set up for Halo households – YouTube](#).

TRAP BOXES

- Traps set outside should be placed inside an appropriate trap box. This reduces the risk of non-target animals (and people) accessing the trap. Boxes also direct the target animal onto the trap to ensure an effective and more humane kill and protect the bait from weathering. The trap box should be firmly secured (e.g. pinned to the ground with a stake) to prevent movement.

Single-set DOC 200 trap box

The length of this trap box can be extended by 50 mm, making it 450 mm, to include a mouse trap at the blind end.

Note: trap must have 5 mm clearance from side walls of tunnel, from roof of trap box, and from mesh baffle. Trap box requires internal dimensions 10 mm bigger than trap height and width.

Further information on how to build a DOC series trap box, including how to fit the trap, can be found at [DOC series best practice tunnel designs](#).

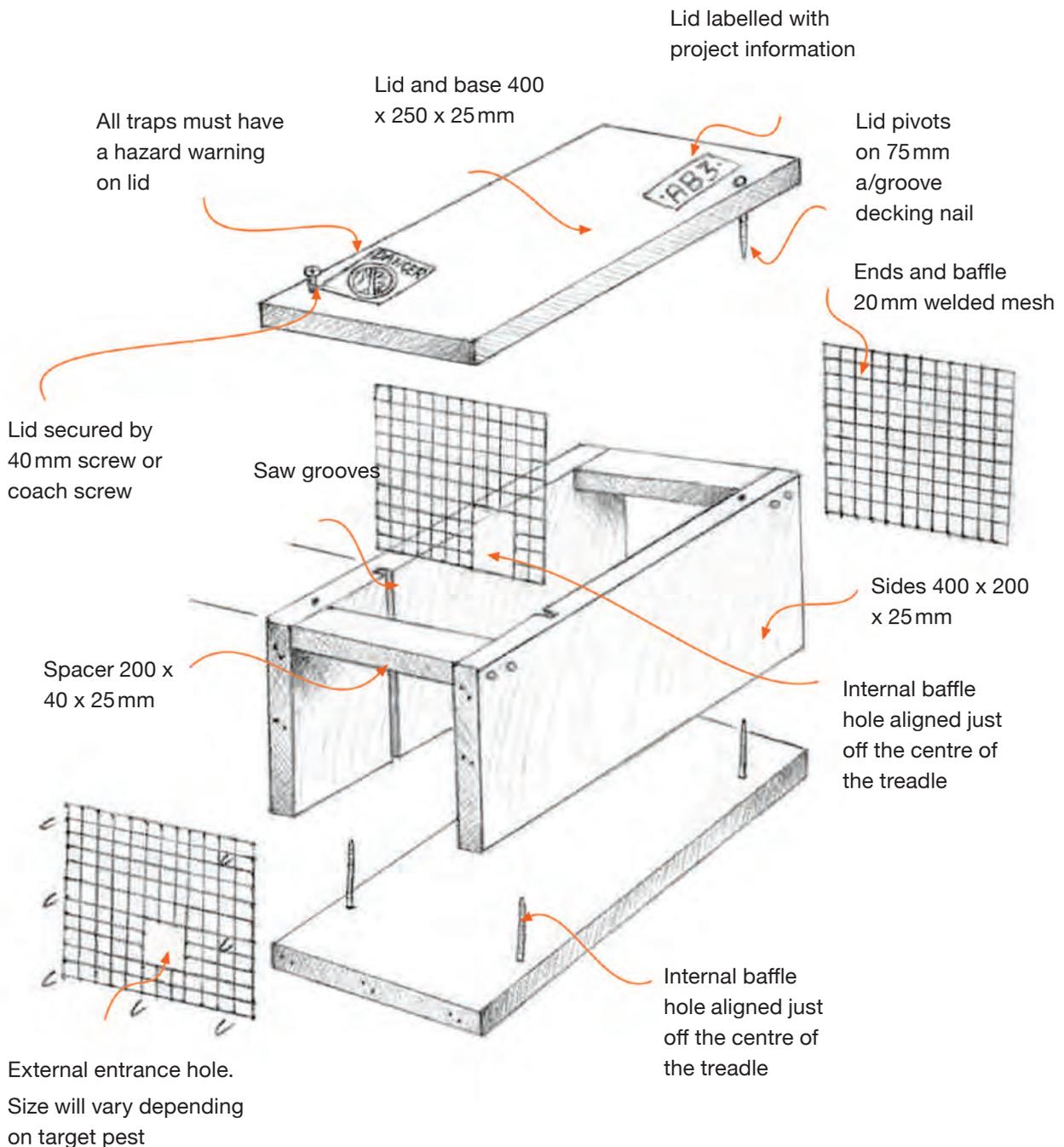
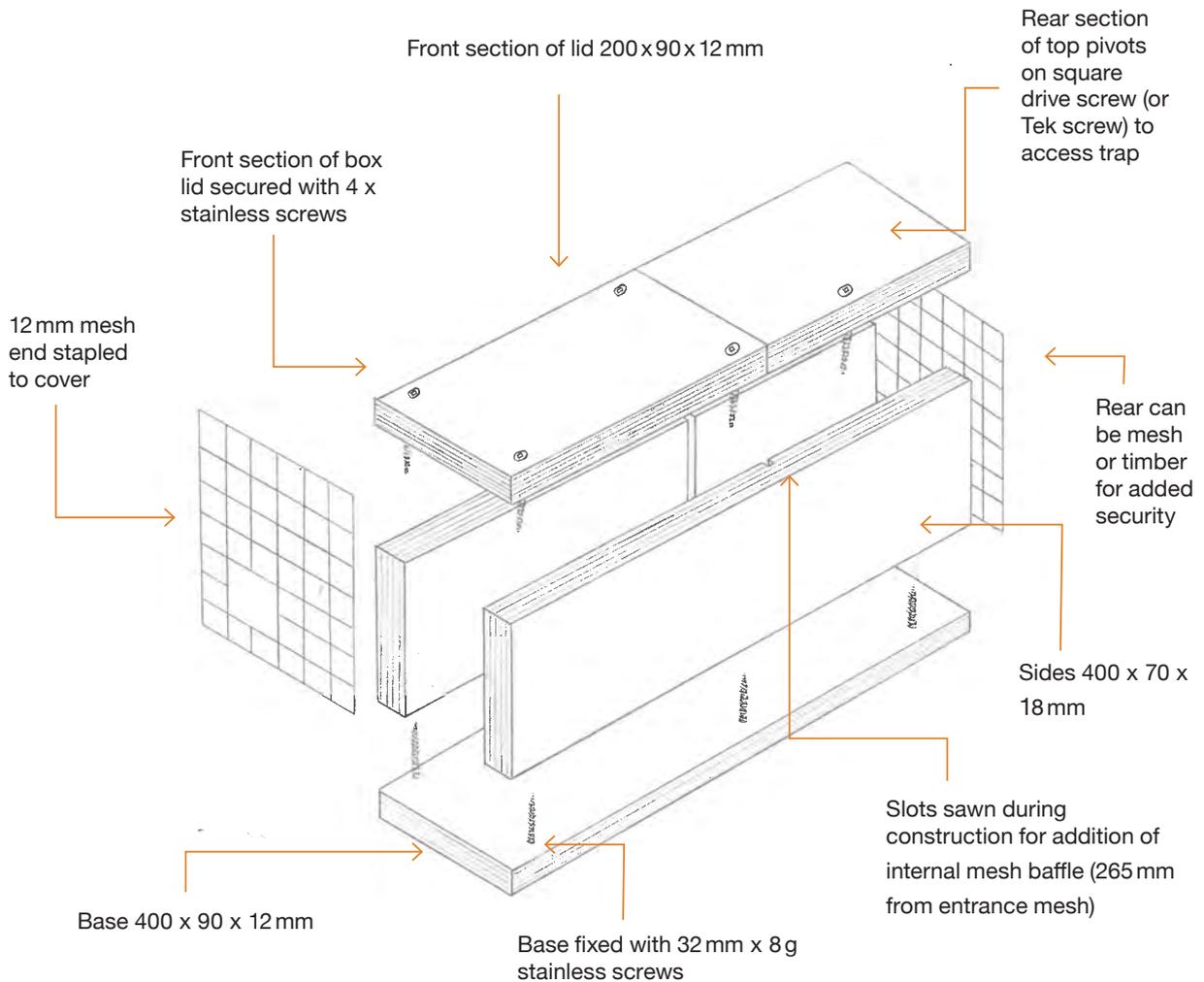


Image: Phil Waddington from DOC Predator Trap series factsheet.

Mouse trap box

This New Zealand DOC designed plywood tunnel is for Victor mouse snap traps.



- Construction is all H3.2 treated ply.
- 18 mm ply is recommended for the sides for sturdier construction.
- 12 mm ply is sufficient for the top, base, and end (consider 400 x 90 x 25 H4 treated solid timber base if deployment is permanent).
- Completed internal dimension must be at least 70 x 55 mm to allow trap to operate unimpeded.

Rat trap box

Boxes with Victor Professional rat traps can be made from different materials. Here are two examples, one wooden, and one made from corflute with a wooden base. *Images taken from 'Predator Traps – DOC Series trapping systems' Rat trap wooden tunnel design (doc.govt.nz).*

Wooden tunnel

Step one

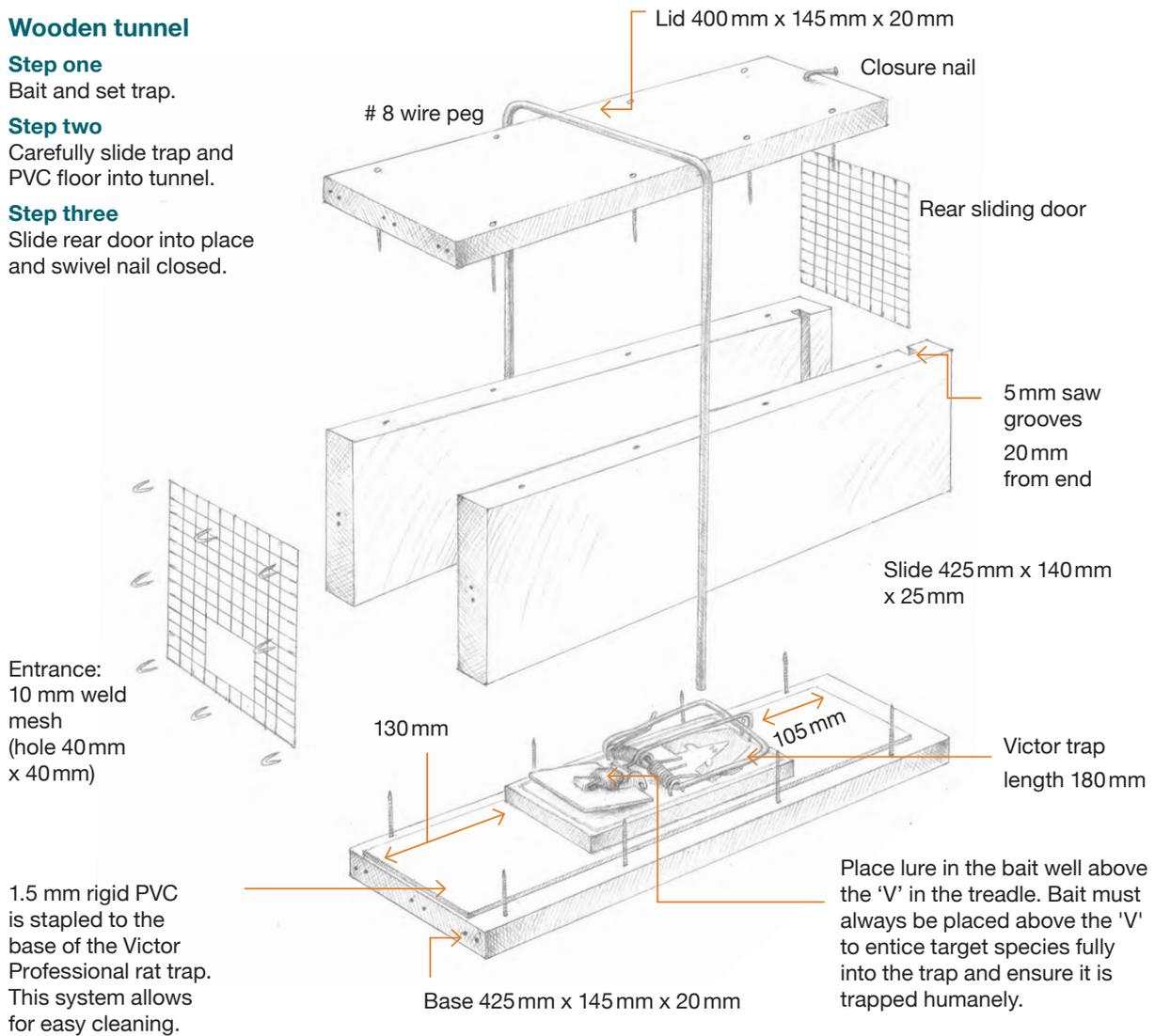
Bait and set trap.

Step two

Carefully slide trap and PVC floor into tunnel.

Step three

Slide rear door into place and swivel nail closed.



Corflute tunnel

Step one

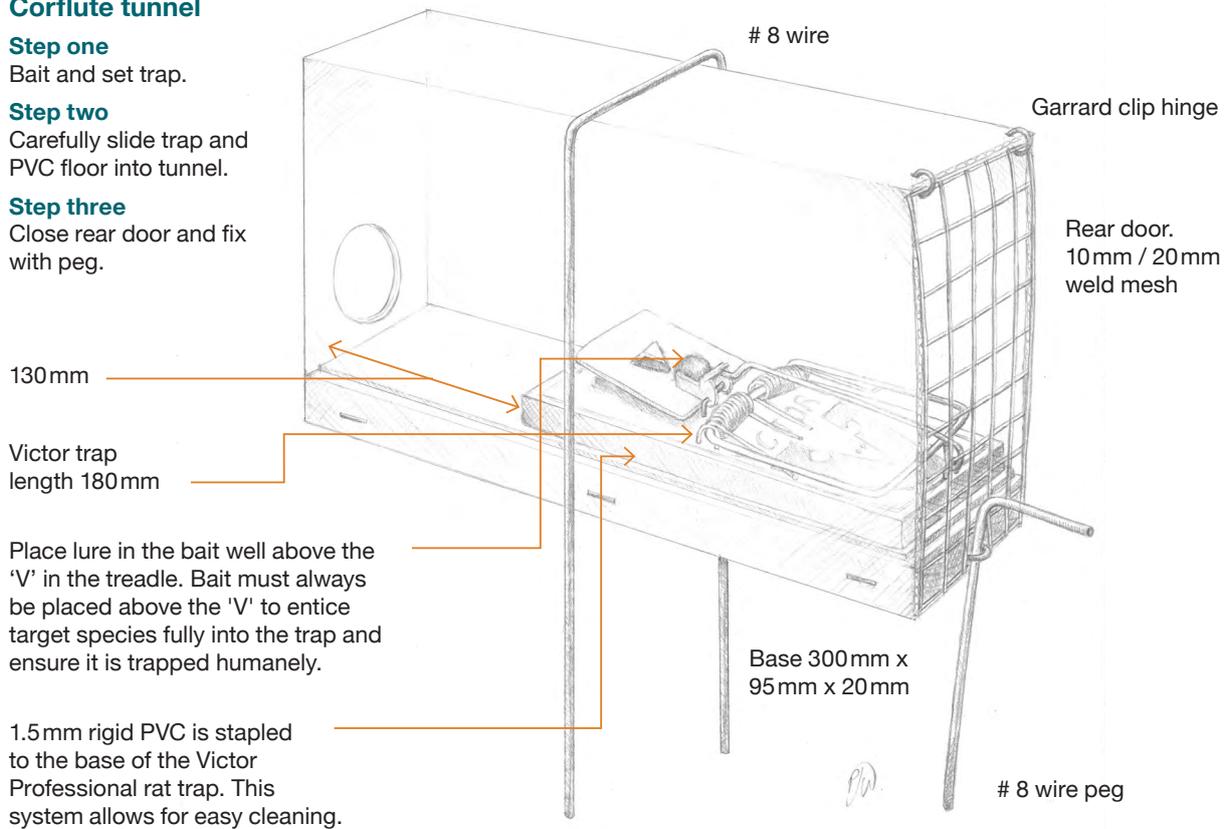
Bait and set trap.

Step two

Carefully slide trap and PVC floor into tunnel.

Step three

Close rear door and fix with peg.



BAIT STATIONS

Use bait stations with caution as rodents can develop bait resistance to the poison baits, making them more difficult to control. This is an increasing problem worldwide. It is recommended that bait stations are only used for a short period (to boost rodent captures during ongoing trapping) or that the type of bait is rotated every few months.

Trapping rodents is the most environmentally friendly method for biosecurity purposes in the outdoors but there are situations when using bait stations might be more practical, for example when rodent populations are unusually high.

Set bait stations, using a rodenticide that is approved for mouse control. Brodifacoum (such as Pestoff Rodent Blocks) is the preferred toxin for targeting both mice and rats. The density of bait stations in the outdoor space is dependent on the amount of bait being applied (usually a 25 m by 25 m grid). Follow the manufacturer's recommendations on the product label.

- Make sure the bait station is made from solid material such as plastic or wood.
- Add enough bait per station to provide a continuous supply between checks, but do not overfill the station to the point that it spills out.
- Ensure the bait is secured and check the bait stations every fortnight. Dispose of bait that no longer looks fresh and top up.
- If all the bait is consumed, either check the bait station more frequently or provide more bait.

Follow the manufacturer's guidance for safety when handling toxic bait. Refer to the Battler Series guides [Removing rodents from small tropical islands with success](#) and [Use anticoagulant rodent bait safely](#) for more information.

4.3.3 *Humanely killing a live captured animal*

For invasive animal species that are live captured during the checking process or are found alive in traps, it is important to kill the animal as quickly as possible.

- Invertebrates can be sprayed with insecticide or squashed using a solid object (hammer, rock, or whatever you have on hand).
- Strike rodents on the top of the head with a hammer, metal rod, or heavy stick. If this doesn't kill them instantly, place the animal on a solid surface and deliver another firm blow to the top of the head. Check that the animal is dead.
- Restrain small lizards so that they lie ventrally flat on a solid surface. Strike downwards onto the head behind the eyes with a hammer, metal rod, or heavy stick. Check that the lizard is dead.



4.4 Checklist: Cleaning pathogens

This checklist will help you disinfect your luggage and goods to reduce the inter-island movement of animal and plant diseases.

Disease causing pathogens can survive for months on people, clothes, transport, and supplies. Disinfection is recommended for those islands more at risk from known pathogens, or when you have been in a known disease outbreak area within the past three months.

The disinfectant SteriGENE is recommended as it works well against a wide range of pathogens, but it does have some risks. It can cause damage if it gets in your eyes, and may cause long-term adverse effects in the aquatic environment.

If you can't access SteriGENE or would prefer to use another option, dishwashing liquid at 2% is a good alternative. Always follow the product label carefully.

HOW TO USE STERIGENE

Important: Wash dirt off items and allow to dry BEFORE applying SteriGENE.

- Use 1 part SteriGENE to 20 parts water for soaking.
- Use 1 part SteriGENE to 50 parts water for cleaning dirty surfaces.
- For use in a washing machine, use 50 ml undiluted SteriGENE instead of washing powder for a 4.5 kg load of washing.

Items to clean	Required actions	Complete Y/N
Yourself	Have a full shower, wash hair, and clean fingernails.	
The building and/or surfaces where pre-departure cleaning has taken place (such as in the biosecurity area)	Disinfect the floor of the building and other horizontal surfaces to prevent contamination of other goods.	
All clothing and other washable goods, such as hats, raincoats, cloth bags	Wash with disinfectant and let dry.	
Footwear	Scrub clean, then wipe down or spray with disinfectant and let dry. The soles of shoes can be placed in a foot bath containing diluted disinfectant and soaked for at least one minute.	
All non-submersible goods including vehicles, trailers, shipping containers, construction equipment, bikes, packaged food	Scrub or wash clean, then spray or wipe down with disinfectant. Disinfectant should remain in contact with hard surfaces for at least one minute (or as specified on the label) and be allowed to drip dry on a surface where run-off is managed. After cleaning, place in clean, sealable plastic bins. Alternatively wrap in multiple layers of plastic, then seal with tape.	
All submersible goods including tools, plastic cartons	Soak in disinfectant for ten minutes (or as specified on the label), or spray with disinfectant and let dry.	
All produce and plants	Ensure fresh produce/plants have been sourced from a location free of known diseases. Spray/wipe down produce surfaces with disinfectant where possible. Where produce surfaces will be ingested (e.g. root vegetables, leafy greens), wash thoroughly with water instead	

4.5 Checklist: For transport operators

This template can be used by biosecurity staff, and/or the transport operator, to check the standard of biosecurity cleanliness and the checking process for any vehicle, vessel, or aircraft involved in transporting goods and people from the supplier to the destination island. It is recommended that this check is carried out at least every six months to ensure that standards are being maintained.

Name of person carrying out the check		Date	
Name of transport operator			
Mode of transport			

Goods transport vehicles

Task	Achieved? y/n	Comments/recommendations for improvement
Check vehicles on a clean, hard surface away from any vegetation, rubbish, or general clutter.		
If you find dirt or other organic matter during the check, clean the vehicle before loading goods. Vacuum interior and hose down the outside, including truck decks.		
Don't put goods on the ground when moving them from one vehicle to another (or a boat). Carry them or use trolleys to move goods. If they must be put down, put them onto a clean tarpaulin.		
Cover exposed goods with an intact cover such as a tarpaulin.		
When not in use, vehicles should be parked on a hard surface (e.g. concrete, tarseal or compacted gravel) that is weed-free. Ensure animal control devices are in place and maintained.		

Boats

Task	Achieved? y/n	Comments/ recommendations for improvement
Rodent control devices are onboard and are well situated and maintained. Residual insecticides (e.g. Ripcord) are applied in the hold.		
The boat is clean with no dirt or organic matter evident. Rubbish is removed or kept in metal/reusable plastic bins with tight-fitting lids.		
The boat is checked for invasive species immediately prior to every inter-island trip.		
When the boat is not in use, doors and compartments are kept closed, rodent guards are correctly installed on mooring lines, and the gangway is withdrawn/raised from dusk to dawn.		
When the boat is out of the water store it on a hard, clean surface (e.g. concrete, tarseal or compacted gravel) which is weed-free. Ensure animal control devices are maintained in the vicinity.		

Aircraft

Task	Achieved? y/n	Comments/ recommendations for improvement
Take-off and landing sites are on a weed-free surface. Keep grass mown to low levels to prevent seeding.		
Animal control devices are used in the hanger and ideally airport wide.		
A long-lasting insecticide (e.g. Ripcord) is regularly and safely applied inside the flight deck, cabin, and baggage holds.		
The aircraft and hanger are kept clean of organic matter, dirt, rubbish, and other non-essential items.		
The aircraft is checked for signs of invasive species immediately prior to any goods or people being loaded for transport to another island.		
Checks focus on the luggage and cargo hold, skids/landing gear, and in the area below the main cabin floor in helicopters.		
When an aircraft is not in use, doors are kept closed.		

4.6 Checklist: For invasive species interceptions

Fill out this form if you find an invasive species on arrival at the destination island. Send your completed form to: *insert the name and contact details of the relevant biosecurity person here.*

Your name		Today's date	
Date of interception		Time of interception (if known)	
Name of person who found the invasive species (if not you)			
Address			
Email		Phone number	

Invasive species details

Species name		Sex	
Was the invasive species collected?		Was the invasive species labelled?	
Where has the invasive species been stored or sent?			
Who identified the invasive species?			

Interception details

Detection method e.g. trap, sighting, droppings	
Location of sighting (brief description)	
Describe what occurred and what was seen, or found	
Island of origin of goods	
Destination island	

Comments/information/references/image

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4.7 Information sheet: Guidance for native wildlife translocations

Objective:

- **To reduce the risk of transferring invasive species when wildlife is moved between islands**

This information sheet is to be used by anyone planning a wildlife translocation between islands. They may not necessarily be a practitioner of this guidance document, but the practitioner can recommend its use.

Native wildlife translocations are a high-risk activity due to the increased potential of moving diseases and other small stowaways such as weed seeds and invertebrates in the feathers/ coats of wildlife or in transfer substrate.



Key messages

- There should be a translocation plan which clearly identifies invasive species at the source site and the measures to be implemented to prevent their transfer.
- All transport containers and equipment are cleaned, disinfected, and dried before and after each use.
- Anti-slip matting in each transport container is disinfected, rinsed, and dried.
- Any vegetation in a transport container is inspected carefully and disinfected where necessary. Vegetation is not re-used and is not disposed of at the release site.
- A site is designated for biosecurity cleaning and inspection at the point of departure when translocating animals from the source site directly to the island.

Recommended actions

1. Consult with specialists to identify:
 - Pathogen, weed, and animal invasives at the source site and the biosecurity measures required to prevent their transfer to the destination island, including what to do if a stowaway is found during the transfer process.
 - Species-appropriate procedures for final checks and cleaning of animals before they are put into transport boxes. Be aware that box materials and substrates can absorb disinfectants and become toxic, especially to frogs.

Include these measures in the translocation plan.

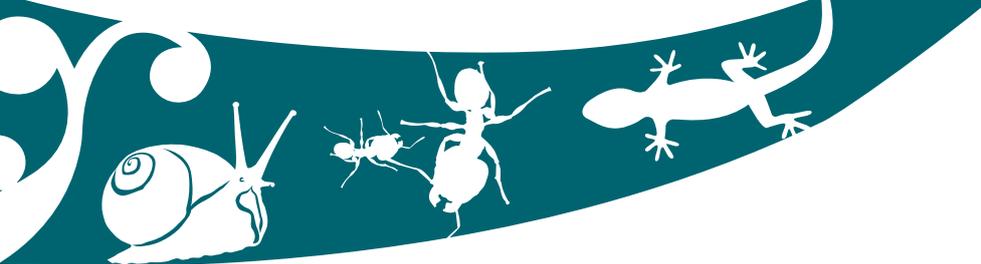
2. Manage and clean equipment to be used during the translocation to minimise biosecurity risks.
 - Have a separate set of equipment for the source and destination sites, or if this is not possible minimise the amount of equipment taken between sites. If gear must travel to the destination island, clean and seal it in metal/plastic cartons prior to departure.
 - Do not use transport containers made of corflute or other materials with hollow walls that can act as a refuge for pests.
 - If you are translocating frogs, consult specialists on how to minimise the risk from disinfecting equipment, transport containers, and substrate.
 - All equipment used in the translocation should be cleaned, disinfected (by applying SteriGENE at a 1:50 dilution for hard surfaces or soaking absorbent materials in a 1:20 dilution for ten minutes) and dried as close as possible prior to their use and again before re-use or storage.

- Where possible, use damp towels in place of organic substrates. Disinfect these using SteriGENE in place of washing powder at a concentration of 50 mL per 4.5 kg load of washing. Rinse before drying.
 - Do not use organic substrates if possible. If essential, inspect substrate for invasive species before adding it to the transport containers.
 - Do not take substrates from areas where invasive species are known to be present (such as invasive ants).
 - Do not dispose of used substrate or vegetation at the release site. Instead, either return it to the source site or put it in urban rubbish disposal where appropriate.
3. If the translocated animals are not passing through a biosecurity area (e.g. are being transferred directly from the source site to the island by helicopter), clearly define a temporary site for final biosecurity checks where the transport containers will depart the source site.
 4. Check and clean the animals being translocated as they are placed into clean transport boxes. If they appear unwell, do not translocate them.
 5. Ensure that anyone involved in the translocation follows biosecurity measures.
 - Where possible, do not allow people working at the source site (e.g. catchers) to travel to the destination island.
 - Where the same people must handle animals at both the source site and destination, they should have a second set of disinfected clothes and boots to change into before arriving at the destination island.

If this is not possible, ensure that people wash their hands and clean their boots with disinfectant (SteriGENE at a 1:50 dilution) immediately prior to boarding their transport.

TIPS FOR GOOD WILDLIFE BIOSECURITY PRACTICE

- Apply a pre-translocation diet that does not include viable seeds that could be passed through the digestive tract.
- When supplementary food supplies are required at the release site, use non-viable seeds, and take live insects from the source site only when necessary.
- Pre-check helicopter landing sites for weeds during source site visits and, if present, remove them or use an alternative landing site.



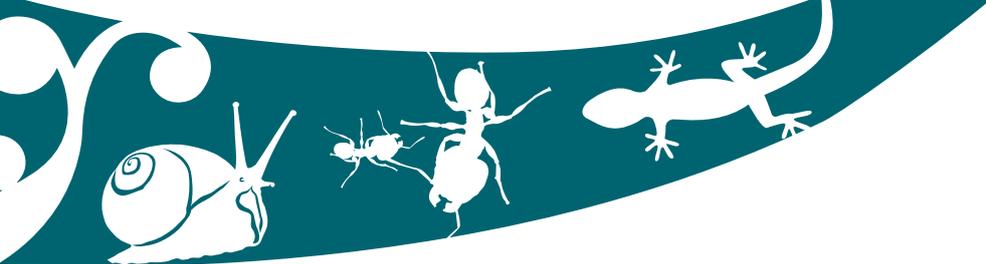
5. KEY TERMS AND ACRONYMS

<p>Biosecurity</p>	<p>Sometimes used to include all aspects of invasive species management, but in this document used in the more restricted sense of preventing the spread of invasive species across international or internal borders, including between islands.</p> <ul style="list-style-type: none"> • International biosecurity – prevents movement of invasive species and diseases between nations and from entering the Pacific region through trade. • Inter-island biosecurity – prevents the movement of invasive species and diseases between the islands of a territory, nation, or island group. • Within-island biosecurity – prevents the spread of invasive species between different sites on an island.
<p>Biosecurity control measures</p>	<p>Actions to reduce the risk of incursion or spread of invasive species.</p> <ul style="list-style-type: none"> • Pre-export – regulations or controls/practices which aim to prevent the export of known pests from places where they are established to other islands. Pre-export actions are not covered in this document. • Pre-border – regulations or controls/practices applying to importation to an island or country. • At the border – controls/practices which aim to detect and hence prevent the arrival of species on-island. • Post border – early detection and rapid response (including immediate eradication) which aims to eliminate newly arrived pests before they can spread far beyond the point of arrival.
<p>Border</p>	<p>A defined boundary with potential control points for the movement of goods and people; often a national boundary but for inter-island biosecurity ‘border’ can refer to the body of water separating islands. Biosecurity measures can be implemented on both sides of the border.</p>
<p>Endemic</p>	<p>A plant or animal that is naturally only found in a certain area.</p>
<p>Eradication</p>	<p>The complete removal from an island of all individuals of an established (breeding) invasive species population.</p>
<p>Incursion</p>	<p>The arrival of an unwanted invasive species on an island.</p>
<p>Incursion response/ rapid response</p>	<p>The process of finding and removing all invading individuals from an island as soon as possible after detection to stop a breeding population establishing.</p>
<p>Interception</p>	<p>Detection and removal of invasive species in transit, prior to departure, or on arrival.</p>

Inter-island biosecurity stakeholder	A person, business, or authority involved in the movement of goods and people between islands at the domestic level. In these guidelines this includes suppliers of goods, travellers, port and airport authorities, transport operators, livestock operators, and suppliers of nursery plants and produce.
Introduced species	A species living outside its native range, which has arrived by human activity, directly or indirectly, either deliberately or accidentally.
Invasive species	Introduced species that becomes destructive to the environment or other human interests. An invasive species can also be a pest and is sometimes called an invasive alien species.
Pathogen	Fungi, bacteria, virus, or other microorganism that can cause harm to people or the environment.
Pathway	How an invasive species can be transported into a country and/or between islands. For simplicity, in this document pathways include 'how an invasive species is moved' and 'what it is moved on' (vectors) such as goods, produce and plants. Invasive species can arrive along human assisted pathways such as air and shipping, or on their own, along natural pathways such as by swimming, floating, or flying.
Prevention	The actions applied to reduce the chance that people, freight, and their transport carry invasive species to an island.
Surveillance	The actions associated with trying to detect an invasive species if or when it arrives.

ACRONYMS

ISSG	Invasive Species Specialist Group of the International Union for Conservation of Nature (IUCN)
NZ DOC	New Zealand Department of Conservation
POI	Protect our Islands. The PRISMSS programme concerned with international and inter-island biosecurity
PRISMSS	Pacific Regional Invasive Species Management Support Service
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme



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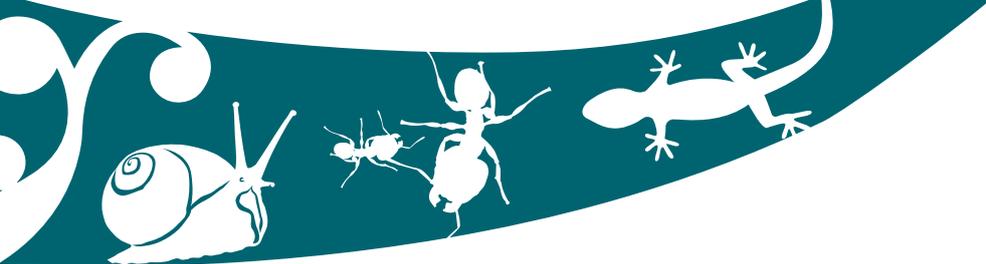
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7. ACKNOWLEDGEMENTS

Kate Steffens, Souad Boudjelas, Jenny Long, and Karen Vincent from New Zealand's Department of Conservation (DOC) led the development of this guidance document.

We acknowledge the support of all DOC staff, PRISMSS partners, and other stakeholders involved in the review and refinement of this document: Steve Cranwell (Birdlife International), Richard Griffiths (Island Conservation), Monica Gruber (Pacific Biosecurity, Wellington Univentures), David Moverley (SPREP), Jessica Kay (SPREP), Peter Corson (Quality Conservation Ltd), and Clayson Howell (DOC).

We wish to thank Tehani Withers, Melania Bulimaitoga, Sam Panapa, Patrick Barrière, and Laura-Line Lafille — invasive species practitioners in the Pacific who reviewed the document and assessed its 'practitioner friendliness' for the Pacific region.

Thank you to Bolster Design Limited for the graphic design of this document and to the DOC Creative Services team for reviewing it.

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