

ANNEX 4: BIOSECURITY PLANNING AND INCURSION RESPONSE FOR RODENTS

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1 Introduction

1.1 Overview of biosecurity and incursion response

1.1.1 Biosecurity procedures are implemented so as to reduce the risks of invasive species spreading to new areas or reinvading areas from which they have been cleared. This means preventing the export of species *from* islands as well as preventing their arrival on islands.

1.1.2 *(Re)incursion* is when an invasive animal arrives on an island that was previously free of that species. If an incursion/reinvasion is not handled effectively, it can soon become a *(re)invasion*, whereby a breeding population of the invasive animal is established. Response to a reinvasion will require a(nother) full-blown eradication operation to be developed and implemented. It is far preferable, therefore, for conservation, financial and social reasons, to prevent (re)incursions from becoming reinvasions, and ultimately, to prevent (re)incursion in the first place. This is the purpose of biosecurity.

1.1.3 Biosecurity is relevant to all stages of an island restoration programme, even before eradication has taken place - you do not wish to transport *any* species between sites.

1.1.4 Biosecurity is also important for sites where no invasive species have been recorded. It should not be assumed that failure of an invasive species to arrive and establish in the past in any way indicates that an island is safe from future invasion. The rate of rodent invasion on islands has hardly slowed in the past century. It may be luck, as much as anything else, which has kept some islands 'invasive-free' so far.

1.1.5 Biosecurity planning involves the identification of risk species and 'pathways' (routes to the island) and multiple barriers that can be placed along those pathways to obstruct the movement of invasive species.

1.2 Implementation

1.2.1 There are then three areas of biosecurity implementation – quarantine (prevention), surveillance, and incursion response:

1.2.2 **Quarantine or prevention measures** are devised, installed and continuously applied to in order to reduce the chance of invasive species moving from one area to another;

1.2.3 **Surveillance procedures** are put in place to search for any sign that an invasive species has slipped through the preventative measures, and to raise the alarm quickly if quarantine has been breached;

1.2.4 **Incursion response plans** are required so that people are ready and able to respond quickly and efficiently to any incursion (breach of quarantine) by an invasive non-native species.

1.2.5 Quarantine measures aim to prevent (re)incursion events, surveillance and incursion response aim to identify and respond quickly enough to incursion events to prevent (re)invasion.

1.2.6 In order to prevent incursions becoming invasions, the biosecurity implementation team must be ready to respond immediately – preferably, a team will be on the island implementing the incursion response plan within 48 hours of detecting an incursion. Such response requires a high level of planning and preparedness, just like for initial eradication programmes: who will go, which boat/helicopter will be used, where does it leave from, where will all the necessary gear (including rodenticide) be stored?

1.3 Planning

1.3.1 Detailed planning and preparation are integral to biosecurity. Someone with no knowledge of the island should be able to pick up a biosecurity plan and implement it, if necessary.

1.3.2 Detailed biosecurity planning benefits from an in-depth knowledge of the island and the ways in which it is used. The quality of a plan is likely to develop during the course of a restoration programme. As such, it is recommended that an initial, brief biosecurity plan and biosecurity checklist (for use before embarking on trips to/from the island) are in place from the outset of the project and that a more comprehensive plan is developed towards the end of the eradication operation. This comprehensive plan should be in place before the eradication team leave the islands.

1.3.3 A **Biosecurity Plan** should be considered a living document and should be reviewed regularly. The responsible organisations/stakeholders should be outlined in the project governance section of the Project Plan. If there are any significant changes in island use/incursion risk or external factors such as regulations surrounding permitted rodenticide use then it should be reviewed immediately. Similarly, if there is an incursion event, plans should be reviewed as soon as the incursion has been dealt with.

1.3.4 These guidelines specifically cover biosecurity planning and incursion response for invasive non-native *rodents*, but you should consider including in your plan measures to mitigate risks from all unwanted species, e.g. pathogens, invertebrates, plants and vertebrates. These guidelines are written as part of the *Current Recommended Procedures for UK (bait station) rodent eradication projects*, but can be applied to all islands requiring a biosecurity plan, even when no eradication has taken place. Other documents are available on more general biosecurity planning e.g. from the GB Non-Native Species Secretariat (<http://www.nonnativespecies.org/index.cfm?sectionid=58>).

1.3.5 In order to complete a Biosecurity Plan, you must:

- Identify and describe characteristics of the island that will affect biosecurity measures;
- Identify and prioritize risk species and pathways;
- Identify multiple barriers you can place in the pathways to mitigate the risks posed (Quarantine/ prevention measures);
- Design an appropriate Surveillance Strategy;
- Develop an **Incursion Response Plan**; and
- Have the plans reviewed by an independent expert, and amend them as necessary.

1.3.6 There are few hard and fast rules with biosecurity as so much depends on the island's unique characteristics, however, as general guidance:

- Place multiple barriers along pathways;
- Deploy multiple types of detection devices;
- Check the devices as often as possible;
- Be prepared to act immediately;
- Maintain constant vigilance.

1.3.7 Once the Biosecurity Plan is approved, you should immediately:

- Put the quarantine measures in place;
- Initiate the Surveillance Strategy; and
- Source equipment needed for the Incursion Response Kit (part of the Incursion Response Plan).

1.3.8 It is imperative that responsibilities for each element of the Biosecurity Plan are clearly assigned to individual staff members/stakeholders. These responsibilities should be built in to formal job descriptions and, where necessary, other responsibilities should be delegated so that sufficient time is available to deliver the Biosecurity Plan. *Do not underestimate how much time biosecurity tasks/responsibilities can take.* In the event of a confirmed quarantine breach, responsible staff should expect to be required to devote a significant amount of their time in the following weeks (most likely all of it) to implementing the incursion response plan. **At least six weeks are likely to be needed.** Managers must be prepared for, and supportive of, this.

1.3.9 It is important that the Biosecurity Plan is able to minimise the risk of invasive species being transported, whilst still allowing the site to function as a home, place of work, conservation area or site of tourist interest. Compliance from all island users is required for biosecurity to be successful. Expectations need to be sensitively managed and it's important not give the impression that it's going to be all gain and no pain. The key message should be that "it's worth it".

1.3.10 In order to complete the Biosecurity Plan, consult with other island users, for example, fishermen, graziers, and boat/ferry operators, as well as with island residents and landowners. You will get a better understanding of the risks, real and perceived, and produce a better plan as a result as these stakeholders may think of risks and pathways that do not occur to outsiders.

1.3.11 You will also need to talk with harbour operators on the mainland. If tourists visit the island, you will need to find a way to disseminate information about simple steps they should take to adhere to the biosecurity requirements.

1.3.12 Some elements of international best practice for biosecurity cannot be deployed in the UK at present. Other elements, such as the building of quarantine rooms for storing and checking all island-bound goods/equipment, may be considered impractical, but should still be installed wherever possible. Proposed biosecurity plans should be appropriate to the island and the level of risk, but Plan Managers should be aware of the increased risks where best practice is not implemented. In general, it is likely to be **cheaper to plan and implement thorough biosecurity measures than it is to respond to incursions.** The cost of good biosecurity is the insurance premium paid to protect the conservation value of the island.

1.3.13 N.B. Whilst these guidelines have been tailored for UK use, they remain generic guidelines and the lists of risk species, pathways and surveillance options are not exhaustive. In each case you should consider the unique circumstances and characteristics of your island.

2 Identifying the risks

2.1 Site description

2.1.1 Here you need to identify and describe characteristics of the island that will affect biosecurity measures. This can be achieved by describing the island, its wildlife interest and its uses, and by creating annotated maps of the island.

2.1.2 Do not underestimate the importance of annotated maps and detailed site descriptions: keeping an island rodent-free may depend on the advice and actions of people who have never visited it.

2.1.3 Some key considerations are:

- Where is the island?
 - Distances and orientation to neighbouring islands/mainland
 - Directions and strengths of currents/prevaling wind
 - Proximity to a river mouth/estuary
 - Jurisdiction
- How large is the island?
- How easy is it to get to the island/how often can it be visited?

Are parts of the island inaccessible / have restricted access? (e.g. sheer or unstable cliffs, private property, important archaeological features, protected species or sites, impossible to land in winter/ during seal pup nursing/ sea eagle breeding locations)
- What is on the island? (infrastructure (particularly boat landings or quays), buildings, land use, habitats)
- Who owns, manages and accesses the island?
- Who lives on the island? e.g.:
 - People (how many, are they residents or employees)
 - Livestock and pets (which species)
 - Protected species and habitats
 - Species at risk from rodenticide poison or small mammal traps (e.g. raptors, voles)
 - Species at risk from the arrival of invasive species
- What happens on the island? e.g.:
 - Permanent/seasonal residence
 - Farming (provide details e.g. livestock / arable / organic)
 - Tourism (is it seasonal?)
 - Research (is it seasonal?)
- What is brought to the island, from where and how?
 - People (how many, how often, residents or visitors)
 - Goods & equipment (food, agricultural feed/seeds, fleece bags)
 - Boat (describe types) / air / road causeway
- What and where are the natural and manmade access points?

2.1.4 Consult widely with local communities – they will be a valuable source of information on species present on the island/surrounding islands, and on the vessels that visit the island.

2.1.5 They can also advise on potential effects on biosecurity risks that may not be apparent to experts who are only on the islands over winter during rodent eradication (e.g. seasonal ferries, increased visitors, migrating species).

2.1.6 It is also an effective way to find out what the local community perceives as the high risk species and pathways and gain commitment to comply with the plan. *Remember, you need all residents and other island users to comply with biosecurity in order for it to be effective.*

2.2 Risk species

2.2.1 Identify what is at risk on the island from the arrival/spread of invasive species, and which invasive species would be most damaging, were they to arrive.

2.2.2 You will need to know about the ecology of risk species. Their behaviour, feeding habits, and reproductive traits will all define the impacts they are likely to have on the island, as well as how quickly the impacts will be felt and how likely they are to arrive in the first place. See Annex 3 for a summary of relevant rodent ecology.

2.2.3 Particularly problematic invasive mammals in the UK include:

- Brown (Norway) rats *Rattus norvegicus*
- Black (ship/roof) rats *R. rattus* (these are rare in the UK but, as their name suggests, are often found on ships and in ports and so the level of risk may be higher than assumed)
- Feral cat *Felis catus*
- American mink *Neovison vison*
- Hedgehog *Erinaceus europaeus* (where not native)
- Feral ferret *Mustela furo*
- Stoat *M. erminea* / weasel *M. nivalis* / polecat *M. putorius* (where not native)
- House mice *Mus musculus/domesticus*
- Grey squirrel *Sciurus carolinensis*
- Deer (all species where not native)
- Goat *Capra spp.*
- Rabbit *Oryctolagus cuniculus*¹

¹ The impacts of rabbits on UK islands are not fully understood, aside from destabilising archaeological sites, and have been considered important for vegetation control on some seabird islands.

2.2.4 You should establish which invasive species are resident on nearby islands/mainland/and the ports from which the island's service vessels embark.

2.2.5 Rodents are more likely to arrive on an island and remain undetected than many of the larger invasive mammals and so are likely to be high risk species for all islands. If you identify species other than rodents as your island's highest risk, seek further advice – but bear in mind the principles of these guidelines will be equally applicable for many invasive animals.

2.2.6 Consider damage beyond the island's conservation interest, e.g. to island culture, economic activities or archaeological interests. These may be more important to stakeholders (whose compliance you require for biosecurity measures to be successful) than conservation concerns.

2.2.7 You can either use the species and features identified through your site description in order to assess which might be susceptible to harm by invasive species, or you can list invasive species that might arrive on your island and identify the damage they could do. See Table A4.1, A4.2 and A4.3.

Table A4.1 - Risks identified by important species/island features (illustrative only)

Important species/feature	Risks posed by invasive species	Impact speed	Impact severity
Manx shearwater	Predation or disturbance by brown rat, black rat, stoat, cat	Rapid	Critical
	Possible competition with rabbits for burrows	Slow	Moderate
Storm petrel	Predation or disturbance by brown or black rat	Rapid	Critical
	Possible predation by house mouse	Rapid	High-critical
Breeding waders	Predation by rats, fox, mink, cat, hedgehog	Rapid	Critical
Endemic subspecies of vole and wood mouse	Competition/possible predation by brown or black rat	Moderate	Moderate
	Possible competition with house mouse	Moderate	Moderate
Scheduled ancient monuments	Rabbit warrens / burrowing under structures causing destabilisation	Moderate	High

Table A4.2 - Risks identified to the site by the invasive species present (illustrative only)

Invasive species	Description of impacts	Impact speed	Impact severity
Brown rat	Decline and loss of native plants, invertebrates and vertebrates through predation and competition, including species for which UK has international importance.	Rapid (rapid rate of reproduction)	Critical
Feral cat	Decline and loss of vertebrates, including species for which UK has international importance.	Moderate-rapid (slower rate of reproduction)	Critical
Rhododendron	Decline in populations of native plants and invertebrates and vertebrates through habitat alteration.	Slow (woody shrub)	Moderate

Table A4.3 - Example classification of impact severity of risk species on the various biodiversity, economic and cultural interests of an island. From Bell *et al.* 2014, adapted from Pacific Invasives Initiative, 2010.

Impact area Impact Severity	Biodiversity	Economy	Culture
Critical	Loss of a threatened native species / species occurring in internationally important numbers	Significant reduction in income from tourism Significant costs of controlling rodents or of replacing rodent-damaged goods	Permanent damage to archaeological features
High	Loss or significant decline of at least one native species	Reduction in income from tourism High costs of controlling rodents or replacing rodent-damaged goods	Major damage to archaeological features
Moderate	Decline in population of several native species Decline in a species of significance	Decrease in tourism Continued costs in managing rodents	Degradation in an area or historic site
Low	Decline in population of at least one species	Small decrease in tourism	Small changes in protected archaeological sites Small changes to quality of an area of importance

3 Pathways

Once you know which species would cause damage were they to arrive, next you need to identify which 'pathways' an invasive species could use to reach the island and how likely is it that the pathway would be used. Once you have done this, create an annotated map of the island which identifies all possible incursion points.

Pathways are categorised into two types: natural and human-assisted.

3.1 Natural pathways

3.1.1 For rodents, mustelids and other mammals, natural pathways essentially comprise swimming or floating on driftwood/storm debris. Birds and some invertebrates may be able to fly or may be carried by the wind. Plants, fungi and pathogens may also be dispersed by wind. Other extreme and less predictable weather events may also assist arrival: climate change may exacerbate these risks. For tidal islands regular invasion should be anticipated as rodents and other mammals can simply walk across to them.

3.1.2 At the outset of a restoration project (i.e. at the feasibility stage) (or, if no eradication is required then as part of the biosecurity plan,) you should confirm the invasive non-native species present on surrounding islands and other islands/mainland from which island-bound services embark. DNA sampling may provide a useful guide to previous invasion sources and hence possible reinvasion risks, and can confirm the source(s) of any future invasion(s). See Annex 2 for information on DNA sampling.

3.1.3 Different species have different swimming strengths and this is important information in determining the risk from potential sources based on their proximity to the island. Water temperature, currents, and wave conditions have an un-quantified impact – do not assume that apparently adverse conditions will prevent arrival over distances shorter than those described below. Strong currents, for example, may slacken when the tide turns.

3.1.4 As a guide, see Table A4.4:

- Brown rats can swim better than black rats which can swim better than house mice. Mice, however, are high-risk stowaway invaders.
- At 50m all rodents can easily swim to an island, and will do so frequently.
- At 500m black rat will invade but the frequency of incursions may be low.
- At 500m brown rat could, in many circumstances, be expected to reach the island every year.
- If the distance is near the currently known record for the species, they can be expected to invade but may not.
- If the distance is twice the currently known record, reinvasion by swimming may not occur but we do not consider it impossible.
- It is only islands several kilometres off-shore where we can categorically say that rodents will not be capable of swimming there. This may be reduced for islands surrounded by strong currents, but this must be considered on a case-by-case basis. However, the risk of quarantine failure on human-assisted pathways is ever present no matter how far it is.

Table A4.4 - Guidance on rodent swimming distances

Species	Known swimming capability
House mouse	500m
Black rat	750m
Brown rat	1000m ('easy') 2000m (less frequently) 4000m (possible)

3.1.5 Longest distances achieved in cooler (UK) waters may be less than stated, but for the purposes of biosecurity planning these distances should all be considered swimmable in a UK context.

3.1.6 N.B. As research continues in this area, swimming capabilities are often revised upwards.

3.2 Human-assisted pathways

3.2.1 The main pathways are (see Table A4.5):

- vessels used for transport to the island (for people, goods or services);
- leisure activities in waters surrounding the island (even if vessels do not make land), and
- shipwrecks (includes vessels that pass near but do not make scheduled stops at the island).

3.2.2 These usually result in unintentional introduction of species, but intentional release may also be an important pathway, particularly if the initial eradication is contentious. Bear in mind that other illegal or unregulated activity may also represent a significant pathway.

3.2.3 Human-assisted climate change is also likely to increase the movement of invasive species, but is not considered further here, beyond highlighting that increased storm events may increase the risk of arrival by floating on storm debris. Managers of islands close to estuaries should take particular note.

Table A4.5 - Examples of human-assisted pathways

Pathway	Activity
Small boats	Fishing/harvesting of local resources Transport between islands Boat trips for tourists Research trips – government/conservation bodies Private/residents transport/leisure
Larger/Commercial boats	Yachts Waste removal Transport of cargo/supplies Ferries Fishing fleets Tourism, incl. cruise ships Fisheries inspection, military, customs, police
Any boat	Shipwreck
Aircraft	Cargo Passenger/tourism Private
People	Intentional release

3.2.4 Boats are likely to vary considerably in the risk level they pose and should not be lumped together when assessing risk levels. e.g.:

- Small boats with no concealed areas which do not moor close to the island or stay overnight are likely to be lower risk than larger boats with a closed bilge/places for a rodent to hide which moor up to the island and stay overnight (rodents being more active at night).
- Boats carrying items such as waste/animal fodder/human food supplies, especially if cargo has been left in storage for any length of time, are likely to be higher risk than day-tripper tour boats.

3.2.5 Once you have established the pathways a species may take to get to your island, assess their likelihood of arrival. If resources are insufficient to cover all invasive species, you should prioritize those which are considered most likely to arrive and cause damage. See Table A4.6.

Table A4.6 - Risk matrix combining impacts and likelihood of arrival of invasive species to the site (illustrative only)

Invasive species	Impact speed	Impact severity	Likelihood of arrival
Brown rat	Rapid	Critical	High – likely stowaways and good, willing swimmers
Feral cat	Moderate	Critical	Low-Moderate - unlikely stowaways and don't like to swim. But are sometimes present as pets on boats and may reach islands this way
Rhododendron	Slow	Moderate	Medium - not present in nearby habitats/landscape, but seeds can be dispersed long distances.

4 Creating a quarantine (prevention) plan

4.1 Aims and objectives

4.1.1 The main aim of the quarantine plan is to prevent (re)incurion events by identifying barriers you can place along pathways to obstruct the movement of invasive species. If resources are insufficient to cover all invasive species or pathways, you should identify and prioritize those which pose the greatest risks to your particular island (e.g. species which are most likely to go undetected, boats that visit most often, that carry higher risk goods/people, that stay near the island overnight, or that come from highest risk places).

4.1.2 The principle of prevention is to place as many barriers and checks along pathways of introduction as possible. Barriers should be placed and checks made so as to:

- prevent species getting on to vessels, either directly (e.g. climbing up mooring ropes) or indirectly (e.g. as a stowaway in cargo);
- prevent species dispersing from land within swimming distance of the island;
- identify the presence of species on vessels in transit;
- prevent species getting off vessels; and
- prevent species getting out of quarantine areas on the island.

4.1.3 The exact measures deployed will depend on the species and pathways identified for your island. Carefully consider each pathway that you have identified and ensure there are multiple barriers in every one that is recognised as a biosecurity risk.

4.1.4 As many stakeholders as possible need to be aware of these preventative measures and content to implement them. This should include:

- island residents;
- dock/wharf/marina operators;
- vessel operators and owners;
- aircraft operators (those responsible for loading aircraft and running airports);
- tour operators and tourists;
- researchers; and
- any other visitors (e.g. fishermen, graziers, civil servants/inspectors).

4.1.5 Try to make the quarantine/preventative measures as simple as possible – the harder they are the less likely people are to undertake them.

4.1.6 Stakeholder engagement may be made easier if you are able to identify and communicate the benefits *to them*, as well as to wildlife, of the island being free of the invasive species in question.

4.1.7 If there are access approvers (e.g. landowners, government departments) you should ask them to make implementation of biosecurity (quarantine/prevention) measures a condition of access to the island. As far as possible, government agencies should assist with ensuring compliance on biosecurity measures.

4.1.8 Those responsible for implementing the biosecurity plan should **inform, motivate** and **equip** relevant stakeholders to implement biosecurity measures. ‘Equip’ means to provide, free of charge, both the physical equipment needed to implement biosecurity as well as technical training. Training should be offered following any changes in staff (e.g. amongst vessel operators) and periodically as a refresher. Annual training is recommended. Adequate funding should be secured for this.

4.1.9 Biosecurity is required in perpetuity and project funding will most likely be time-bound. As such, adequate plans should be made to fund the biosecurity requirements in the longer-term.

4.1.10 Sections 4.2 to 4.5 are not exhaustive, but give some ideas for barriers you can put in place.

4.2 Barrier 1: Actions at points of origin

4.2.1 Have in place baited stations and/or traps on quays of servicing harbours. Such use needs to be in accordance with best practice outlined in Annexes 2 and 5.

4.2.2 Install good waste management and reduce harbourage at quays/along adjacent ‘swimmable’ mainland. You may wish to undertake lethal control measures in high risk habitats along adjacent coastlines to reduce the likelihood of dispersal events (see Annexes 2 and 5).

4.2.3 As far as possible, place island-bound goods and supplies in rodent-proof containers. At the very least, all items (including visitor day packs) should be placed in a sealed container so that they can be inspected for signs of tampering/entry by rodents.

4.2.4 Before loading onto vessels, check goods and supplies that are island-bound for signs of rodent interference, especially items which cannot be placed inside rodent-proof containers or which have been stored overnight or longer. Look for chew marks and signs of entry/holes.

4.2.5 As far as possible, ensure goods are packed on the day of delivery. For items which will be stored long-term or overnight before being transported, store off the ground (e.g. on a pallet) and place traps/rodenticide underneath/around the goods. This is particularly important for high risk goods such as fodder.

4.2.6 As a preference, store all island-bound cargo in a quarantine store after it has been checked. Check cargo again before loading onto the vessel. More detailed information is available if installing a quarantine store is an option for your biosecurity plan (contact sophie.thomas@rspb.org.uk).

4.2.7 For boats moored on buoys or anchor:

- If possible, position the mooring so that the boat remains in the water at low tide;
- fix mooring hoods to mooring lines (where possible use a fixed mooring instead of an anchor);
- ensure nothing is suspended over the side of the boat;

- moor boats in areas free from shore-based rubbish and other food sources or concentrated rodent habitat.

4.2.8 Do not run mooring lines ashore unless you absolutely need to.

4.2.9 Larger ships should use line guards on ship-to-shore lines to stop rodents using mooring lines to get on and off the ship.

4.2.10 Do not land at night unless you absolutely need to.

4.2.11 Consider if any risks can be avoided altogether by a change in practice – e.g. using island sources rather than importing items (invasive-rodent-free Ramsey Island now produces hay itself rather than importing it, for example).

4.2.12 Raise awareness of the invasive-rodent-free nature of the island and inform visitors of biosecurity actions they need to undertake (such as sealing and checking all their bags). Consider:

- placing signs at key departure and arrival points about the risks of reincursion and the measures you would like people to take to reduce risks;
- providing information leaflets at these points;
- placing information on vessels (visual or audio – e.g. over ferry tannoy announcements);
- designing visitor/ferry tickets so that they provide biosecurity information (e.g. using the reverse side for this purpose);
- placing awareness-raising notices in local papers or radio.

4.2.13 Publicise a contact number so people can report if they think they see an invasive rodent/rodent sign.

4.2.14 For people planning to visit a number of islands (e.g. researchers, tour guides, rubbish collection vessels), visit those that are invasive-free (or have less chance of invasive species escaping onto your vessel) before visiting those with invasive species. Visiting islands in order of least risk decreases the chances of you transporting invasives from invaded to invasive-free islands.

4.2.15 Encourage all relevant stakeholders to maintain vigilance at all points of origin.

4.3 Barrier 2: Actions *en route* to the island

4.3.1 Rodenticide poison and/or kill traps should be in place on all vessels which pose a significant risk of transporting rodents to the island. Second generation anticoagulant rodenticides are best for biosecurity purposes on vessels, but check the legality of using them in this way.

4.3.2 All rodenticides and kill traps should be placed in covered and lockable containers and significant effort should be undertaken to reduce risk of harm to all non-target species.

4.3.3 Traps should be checked at least once a day. If they cannot be checked with this frequency, they should not be used. Refer to **Annex 2**.

4.3.4 Rodenticides should be checked at least weekly for any sign of consumption or tampering, and bait refreshed regularly (at least once per month or sooner if weekly checks show it to be damaged by weather/less attractive to rodents for any other reason). Refer to **Annex 5**.

4.3.5 Train boat operators and encourage visitors to maintain vigilance whilst in transit.

4.3.6 If a rodent (or any other invasive species) is found on a boat which is island-bound, the boat should not land. The boat should return to its point of origin until it is clear all rodents present have been removed. Never allow a live rodent to be thrown overboard.

4.4 Barrier 3: Actions on arrival at the island

4.4.1 Do not run mooring lines ashore unless you absolutely need to.

4.4.2 Do not land at night unless you absolutely need to.

4.4.3 Before unloading anything at the island, all packed gear should be thoroughly inspected for sign of rodent exposure (chews marks, gnawed holes, etc.).

4.4.4 Only unload what must be unloaded.

4.4.5 Unpack containers, luggage and cargo in enclosed, rodent-proof, well lit, and tidy areas. Preferably this would be in a quarantine room. This will allow easier detection and capture of any invasive species that do escape. The more secure the area, the easier it will be to stop the invasive species escaping onto the island.

4.4.6 If there are no appropriate buildings on the island and a quarantine room cannot be built, goods should be unloaded and checked close to shore in an area which can be surrounded by people who are poised to take action should a rodent/other invasive species escape. N.B. there are significant additional risks to this approach.

4.4.7 Consider installing lethal control measures at the main incursion points identified earlier in your biosecurity plan (an EIA and measures to limit risks to non-target species will be required).

4.5 Barrier 4: Actions on departure from the island

4.5.1 Apply the 'Actions at points of origin' measures to ensure you do not export invasive species from the island.

4.5.2 Do not remove anything from the island that could contain invasive species.

4.5.3 Remove all your rubbish, including fruit and vegetables, from the island. Rubbish provides a great food source to many invasive species and can hinder both surveillance efforts and incursion responses. Discarded species may also prove invasive themselves (e.g. fruit from vines/climbers).

4.6 Basic biosecurity checklist to be completed by team leaders for all island visits:

Task	Completed?
1. Have I given clear biosecurity instructions to <u>all</u> trip members?	Yes/No
2. Have I checked they have understood these instructions?	Yes/No
3. Have all stores and supplies (which are small enough) been packed in approved rodent-proof containers?	Yes/No
4. Itemise gear too bulky/awkward to fit into rodent-proof containers: • • Items checked immediately prior to departure -	Yes/No
5. Has <u>everything</u> been stored in a rodent-proof room in sealed containers or re-checked immediately prior to departure?	Yes/No
6. Have I checked with every member of trip: - packs kept in rodent-free areas or checked and re-packed since? - no food held in any unsealed bags? - boots and other footwear clean and free of soil/seeds? - packs, pockets, Velcro fasteners, socks, etc clean of weed or grass seed? - no-one in party has worked in area of known invasive plant/invertebrate infestation recently without changing/ washing gear (including shoes/bags)?	Yes/No Yes/No Yes/No Yes/No Yes/No
ANSWERS 1-6 MUST BE 'YES' BEFORE TRIP CAN PROCEED	
7. <u>Identify any added risks of the trip</u> : - are we leaving/ travelling at night? - are there planned stops <i>en route</i> where pests could enter or exit? - are we travelling on a boat with no poison rat baits or effective rodent control measures? - are any items being stored on deck or in non-rodent proof holds?	Yes/No Yes/No Yes/No Yes/No
8. Have I addressed these concerns by identifying and implementing bespoke solutions to minimise potential risk to the islands?	Yes/No
YOUR ANSWER TO TASK 8. MUST BE 'YES' BEFORE TRIP CAN PROCEED	
<u>In Transit to Islands:</u> If any sign of rodent or other invasive species is detected on the boat whilst <i>en route</i> to your destination, DO NOT land at the destination island or any other island until the problem has been identified and remedial actions implemented in consultation with experts.	
<u>On Arrival:</u> - Have I re-inspected all containers for rodent entry or damage which could allow entry? - Has everything been unpacked or opened up and carefully inspected in an open area or quarantine room? - Have I instructed everyone on rules for disposal of organic rubbish? - If planning to go to other islands from here, have I considered and established how to apply quarantine procedures before we leave? - If on a daytrip, have I ensured only day-bags are taken, and that they have been checked as clean and been packed only on the day of departure?	Yes/No Yes/No Yes/No Yes/No Yes/No

5 Designing an appropriate surveillance strategy

If your quarantine/prevention measures fail, your surveillance strategy is all that stands between species of conservation interest or concern and a full blown reinvasion of the island that would take you back to square one. Getting surveillance right requires significant on-going time commitments and carries with it an annual running cost. By preventing invasions, however, it will save a lot of time and money in the long run.

Annex 3 details surveillance methods for rodents applicable to various stages in island restoration projects, including for biosecurity purposes.

However, there are additional, **important considerations when planning a surveillance strategy as part of biosecurity:**

(a) Behaviour of rats in very low densities is less predictable than when an established population is in place, for example:

They are likely to wander widely to explore the island and search for other rodents to mate with. The rat may be nowhere near the point at which it left sign by the time of your next surveillance check. If incursion is detected, you should immediately search across the island to check for further sign.

Following arrival, a new rat is unlikely to be food-stressed and might be most **attracted by good habitat**. Rodent motels are deployed with this in mind - as a particularly sheltered and safe environment they can make ideal habitat and be very attractive to rats.

(b) You need to **plan for the quirks of an individual rat's behaviour** – the rat that has made it to the island might be wary of traps or be uninterested in chocolate flavoured wax. **Deploy as many different types of detection devices as possible.**

5.1 Detection techniques

Detection techniques include:

- Flavoured wax blocks – e.g. chocolate, coconut, peanut butter, meat gravy, fish. Plain wax is considered less reliable for use in surveillance (see Annex 3, Section 2):
- Tracking tunnels/plates or natural mud/sand traps;
- Cameras;
- Traps;
- Visual searches for runs/droppings/chew marks on naturally occurring foods;
- Hair traps; and
- UV light.

5.1.1 See Table A4.7 for the appropriate surveillance strategies for generic island types.

5.1.2 In the UK surveillance cannot usually involve 'passive' killing of invasive species as permanent laying of poison or traps is not likely to be permitted. It is even more important, therefore, that surveillance devices are checked as frequently as possible so as to catch any incursion before it becomes an invasion.

5.1.3 It is worth noting that even international best practice still states that it is better to detect an incursion and launch a calculated response than to rely on permanent baiting.

5.1.4 The location of all permanent monitoring devices should be recorded using GPS and mapped for ease of reference when doing routine surveillance or if incursion response is required.

5.1.5 Carefully archive all devices that display some form of interaction with a species (e.g. tracking cards, chewed wax block) noting exact locations, dates and who interpreted them. This information may be useful to refer to when dealing with future invasion/incursion responses.

5.1.6 Create a biosecurity log (see Table A4.8) to detail all suspicious sign or sightings, **including false alarms**, near-misses or other events occurring as part of the quarantine actions.

Table A4.7 - Appropriate surveillance strategies for generic island types.

Scenario	Recommended surveillance for rodents
<p>1. The island can be easily or regularly visited and is small enough to cover with a grid of detection devices – e.g. up to ca. 250 ha. (Includes inhabited islands)</p>	<p>Deploy a broad array of detection devices over the whole island at about one or two per hectare and check each of them on every visit.</p> <p>Use, primarily, tracking tunnels and flavoured wax blocks. Put fresh tracking cards and wax out each time you visit, or freshen wax blocks by shaving off outer layers – the smell of the flavour (chocolate etc.) should be easily detectable. Wax blocks should be checked within around 7 days of being set. Ideally, tracking tunnels would be run for 7-10 days each time and checked at the end of this period. Add a lure, e.g. peanut butter. Supplement this with looking for feeding sign and footprints on sand or mud.</p> <p>Place wax/tracking cards inside permanent wooden boxes in preference to plastic stations. These can double up for use housing traps or poison if an incursion is detected.</p> <p>Monthly checking is advised. As an <u>absolute minimum</u> do four checks per year (about every three months). If you only do four checks a year and a pregnant female arrives, you can expect a breeding population to be establishing by your next check.</p>
<p>2. The island can be easily or regularly visited but is too large to cover with a grid of detection devices – e.g. larger than ca. 250 ha. (Includes inhabited islands)</p>	<p>Deploy a broad array of detection devices in a range of likely habitats which are easy to access, and at possible incursion points (e.g. around the coastline). Supplement this with looking for feeding sign/footprints on sand or mud.</p> <p>Use, primarily, tracking tunnels and flavoured wax blocks. Put fresh tracking cards and wax out each time you visit, or freshen wax blocks by shaving off outer layers – the smell of the flavour (chocolate etc.) should be easily detectable. Wax blocks should be checked within around 7 days of being set. Ideally, tracking tunnels would be run for 7-10 days each time and checked at the end of this period. Bait them, e.g. with peanut butter.</p> <p>Place wax/tracking cards inside permanent wooden boxes in preference to plastic stations. These can double up for use housing traps or poison if an incursion is detected.</p> <p>Monthly checking is advised. As an <u>absolute minimum</u> do four checks per year (about every three months). If you only do four checks a year and a pregnant female arrives, you can expect a breeding population to be establishing by your next check.</p>

<p>3. The island has a known history of regular rodent incursions, or you expect the likelihood of future incursions to be high (Includes inhabited islands)</p>	<p>Given permanent trap use in the UK will be impractical, and permanent rodenticide baiting considered poor practice, there must be exceptionally high conservation interest on the island for eradication to have been undertaken. Consider installing rodent-proof fences to create exclusion zones around sites of high conservation value. See Xcluder® (http://xcluder.co.nz/xcluder-fences/fences-designs.html) for more information. <u>N.B. if exclusion zones extend to the coast, they cannot be considered complete barriers. Surveillance must continue inside the fenced area, regardless of the fencing.</u></p> <p>Lay poison bait in all buildings on the island – concentrate on baiting during the winter months if permanent baiting is not possible. First generation anticoagulant rodenticides can be used for this if necessary.</p> <p>A network of (empty) wooden trap tunnels should be in place across the entire island which can be used for trapping, baiting or placing tracking cards. Place them on most likely sites if a one to two per hectare grid (or greater if mice are highest risk invader) is not possible.</p> <p>Run tracking tunnels for 5- 10 days and check at the end of this period. Wax blocks should also be checked within around 7 days of being set. Supplement this with searches for sign/footprints on sand/mud and at likely incursion points.</p> <p>Weigh up the costs of fewer, longer visits over shorter more frequent ones. How early do you need to detect and deal with an incursion in order to prevent catastrophic damage to the conservation interest? Where possible, fewer, longer visits are advised.</p>
<p>4. Remote and uninhabited islands which are seldom visited.</p>	<p>Ensure visits, when they do happen, give the team as long as possible on the island. Also ensure that the highest biosecurity standards are adhered to in order to prevent accidental introductions to the island.</p> <p>A network of (empty) wooden trap tunnels should be in place across the entire island which can be used for trapping, baiting or placing tracking cards. Place them in most likely sites if a one to two per hectare grid is not possible.</p> <p>When visiting run tracking tunnels for 5 nights or longer, focusing on likely areas if necessary. Check the tunnels at the end of this period. Supplement searches by using flavoured wax (these should be checked within c. 7 days of being set) and look for feeding sign/footprints on sand/mud and at incursion points.</p>
<p>5. At least one native rodent exists on the island and you want to detect new species arriving.</p>	<p>Carefully select detection devices to maximise the chances of distinguishing between native species and invading species – e.g. tracking tunnels, Bovril wax. Do not use rodenticides pre-emptively.</p> <p>Operate appropriate traps when visiting (e.g. set for rats if resident mice/voles are present) and look for feeding sign.</p>

Table A4.8 – Example Biosecurity Incident Log

Date	Recorder: name/contact details	Incident description	Response/Action taken	Outcome	Additional information
12/3/14	<i>Insert name & number</i>	Rat droppings found on 'Brenda' boat by visitor <i>en route</i> to island	Boat did not land on island – returned to port. Full search conducted of vessel and cargo. Baited and covered traps placed on board. <i>name</i> discussed tighter quarantine measures for the boat with owner and provided refresher info on rat sign. <u>Boat had recently come out of winter storage.</u>	NEAR MISS No rat found. Assumed it left boat after being disturbed. Boat to obtain rodent-free certification next spring before being launched. Owner committed to checking for sign.	Contact details for 'Brenda' owner, <i>Insert name & number</i>
1/5/14	<i>Insert name & number</i>	Member of public <i>Insert name</i> reported rat sighting at grid reference xxxxx	<i>name</i> interviewed <i>name</i> on same day and together visited location of sighting. Considered reliability of report to be poor (middle of day, middle of field), but instigated daily monitoring of surveillance grid 250m in each direction from sighting for four weeks, without further sign. Instigated one island wide check of all permanent surveillance stations	No confirmed rat sign. Regular surveillance checking resumed. Assumed False alarm	(Add hyperlink to completed interview form for this incident)
3/6/14	<i>Insert name & number</i>	Member of public <i>Insert name</i> reported rat sighting at grid reference xxxxx	<i>name</i> interviewed <i>name</i> following day and visited location of sighting alone following detailed description. Considered reliability of report to be poor, but instigated daily monitoring of surveillance grid 250m in each direction from sighting for four weeks, without further sign. Instigated one island wide check of all permanent surveillance stations	No confirmed rat sign. Regular surveillance checking resumed. Assumed False alarm	(Add hyperlink to completed interview form for this incident)
9/8/14	<i>Insert name & number</i>	Member of public <i>Insert name</i> reported rat sighting at grid reference xxxx	<i>name</i> interviewed <i>name</i> same day and together visited location of sighting. Considered reliability of report to be poor, but noted almost identical location to that of 1.5.14 so instigated daily monitoring of surveillance grid 250m in each direction from sighting for four weeks and brought in additional detection methods (cameras and tracking tunnels baited with peanut butter). Instigated island wide check of all permanent surveillance stations. No sign of rats found.	No confirmed rat sign. Regular surveillance checking resumed. Assumed False alarm , but extra surveillance (camera) left in place around sighting	(Add hyperlink to completed interview form for this incident)

6 Confirming and responding to incursion

6.1 Collecting evidence

6.1.1 Correct identification of any sign of rodent incursion is crucial to making the right decision on how to respond. In some situations the evidence of an incursion will be indisputable, e.g. a dead body in a trap on the island/footage captured on a trail camera. However in many cases the evidence will be open to interpretation – e.g. sightings by third parties. It is important, therefore, that evidence collection techniques maximise the information available and minimise the chance of wrong conclusions being drawn from it. Table A4.9 provides advice on collecting and caring for different types of evidence indicating a rodent incursion.

Table A4.9 - Collecting and archiving surveillance evidence

<p>Sightings</p>	<p>Interview the person who made the sighting as soon as possible – preferably on the same day. Take account of their experience but do not judge a sighting on experience alone. The most important factors are how well they saw it, i.e. how close, how long, what visibility. <i>What made them think it was a rat/mouse?</i></p> <p>Ask open questions e.g. “tell me what you saw? how long did you observe it? What did it look like?” DO NOT ask leading questions e.g. “was it brown and about this big?”</p> <p>Record or write <u>everything</u> down, including when the sighting took place, when the interview took place and who conducted the interview.</p> <p>Ensure the exact location of the sighting is recorded, if necessary take the person back to the location where they saw the animal.</p> <p>Always record the incident in the biosecurity log and check it against previous incident records. One vague sighting on its own may be dismissed but if you get a number of similar sightings in a similar area over time you may form a different conclusion. New techniques for identification may present themselves in the future which could allow the archived evidence to be reviewed.</p> <p>Try to establish other evidence that supports or challenges the sighting (could it have been a vole or a shrew, or even a wren?).</p> <p>Use a standard recording form to gather similar information from each sighting.</p>
<p>Droppings or feeding sign</p>	<p>Photograph the evidence <i>in situ</i> where possible before disturbing it. If taking digital photographs, use high definition settings for at least some photos and provide a size comparator (e.g. coin, pen lid).</p> <p>When retrieving evidence to take back, physically mark the spot and collect everything i.e. if there are 24 suspected rat droppings there pick up all 24 and take them back, not just one or two.</p> <p>Take time to look around carefully for other sign such as tracks, hair, scratch marks etc. Remember you are not only looking for evidence of the suspected species, you’re also looking for evidence which may support an alternative explanation.</p> <p>Label the evidence, including photos with detail on when /where /who.</p> <p>If sending evidence to an expert for identification, think about the security of transporting it e.g. this evidence may be the crucial factor in a decision to spend thousands of pounds in a contingency response, so don’t save £5 by sending it in the post instead of by courier or other traceable/more secure transport system.</p> <p>If the evidence is going to be difficult to identify, have more than one expert look at it independently to give their opinion. Ask each of them why they came to the conclusion they did and what other opportunities there may be to further verify this.</p> <p>Always archive the evidence and record the incident in the biosecurity log. Reference it</p>

	against previous incident records (see above).
Carcasses	Photograph <i>in situ</i> . Preserve in alcohol or triple bag and freeze. Label the evidence with details on location, state, and who found it and when. If species cannot be determined (e.g. due to decomposition), follow instructions on gathering DNA evidence in Annex 2.

6.1.2 If there is any uncertainty over the sign, **ask at least two experts to help interpret the evidence**. Experts prepared to offer advice should be identified in advance and their names and contact details should form part of the Incursion Response Kit (see below). As experts may be uncontactable in the field when you need their advice, ensure you gather details of several experts who are prepared to help.

6.1.3 In New Zealand, the first line of action if incursion is suspected is to use rodent detection dogs to help locate any individuals that are present. In the UK there is no trained dog resource at present for island restoration, although training dogs for conservation purposes does take place (e.g. dogs trained to find dead bats around wind turbines) and the potential for bespoke training and application to island restoration purposes is being explored. **At present, dogs MAY NOT be used in UK projects**. The risk of falling foul of the Hunting Act (2004) or Protection of Wild Mammals (Scotland) Act 2002 is too high in the absence of dogs that have gone through a vigorous, bespoke, certified training scheme for island restoration. **Do not deploy dogs in the UK, no matter how obedient/well-trained they appear or their owner insists they are.**

6.1.4 As a possible alternative, caged rats may prove an effective lure for wild brown rats. This has **not been extensively field tested**, but is a promising field of research. **Seek further advice**: the risks of the rat escaping must be managed effectively and there will be animal welfare considerations regarding the use of caged animals, therefore local legislation will need to be consulted. There is evidence to suggest this method doesn't work for black rats, so only consider using if you know only brown rats are present.

6.2 Planning and management for (re)incursions

6.2.1 The following decision tree procedures are designed to help you manage potential incursions promptly and effectively, however they can be guides only as so much depends on island circumstances. This is why independent review is so important. The general course of action is:

- a) A sighting is reported;
- b) The person who sighted the rodent is interviewed as soon as possible;
- c) The location of the sighting is visited (preferably with the observer) and assessed;
- d) Any further evidence is collected and, if necessary, sent to experts;
- e) The sighting is considered either **uncertain/possible** or **probable/confirmed**;
- f) Uncertain sightings trigger a monitoring response;
- g) Probable & confirmed sightings trigger incursion response involving traps and rodenticide; and
- h) All sightings and follow up actions are recorded in the biosecurity log.

6.2.2 If there is a **shipwreck**, the area is immediately **considered as a probable/confirmed incursion and triggers an incursion response**. Consider working with maritime authorities who get involved in the shipwreck response to get more information about the level of risk e.g. if salvage experts are going on board the vessel they could be trained to look for rodent sign in the galley. Knowing the cargo and the prospects for the ship breaking up could also forewarn your response.

6.2.3 The speed of a response is crucial. For a probable or confirmed incursion, you want a team on the island ready to deploy bait/set traps/bolster the grid **within 48 hours**. For this to be possible, the mechanisms for responding to a reported sighting/sign find must be slick and lines of responsibility need to be clear. Transport arrangements should be in place and all equipment ready for loading, if not stored on the island. As UK surveillance strategies are limited to detecting incursion events (by themselves they cannot deal with an incursion), it is even more imperative that plans for incursion response are in place and people are ready to respond immediately.

6.2.4 Where there is already a network of stations in place on the island, use it as the basis for the response. It may need to be bolstered – e.g. if rodent sign is discovered on a large island in an area where there is no grid or only a sparse grid. Speed is of the essence. A sparse but extensive network covering as much of the island as possible is probably better if a grid has to be established than a dense grid in a small area. 1 to 2 devices per ha targeting preferred habitat is sufficient – it doesn't need to be an exact grid because invading rodents are likely to travel. Cover all major habitat types, but focus on preferred sites and known invasion sites. If a grid is already established, you may have time to reduce the grid size around the area of the sighting/evidence.

6.2.5 Place traps around the area of the sighting/evidence where there is plenty of natural cover and where rodents are likely to be active (e.g. alongside large rocks or walls, around the base of trees, under logs, overhanging vegetation, and under buildings). Traps can be baited with a mixture of peanut butter and rolled oats for an easy, durable bait which can be stored as part of the Incursion Response Kit. Tracks are used by invading brown rats and mice. Brown rats tend to be coastal foragers while black rats might prefer interior forest and may avoid tracks. Additionally, refer to Section 6.6 for setting up rodenticide grid from point of rodent sighting.

6.2.6 Having a Rodent Incursion Kit stocked and stored in a suitable place is crucial to preparedness. Some items in the Incursion Response Kit will need to be replaced periodically even if not used (*). An annual inspection of the kit is highly recommended. The contents of the kit will depend on the characteristics of your island, but a starter list is provided in Table A4.10.

6.2.7 Table A4.11 shows an example form for recording bait take during an incursion response.

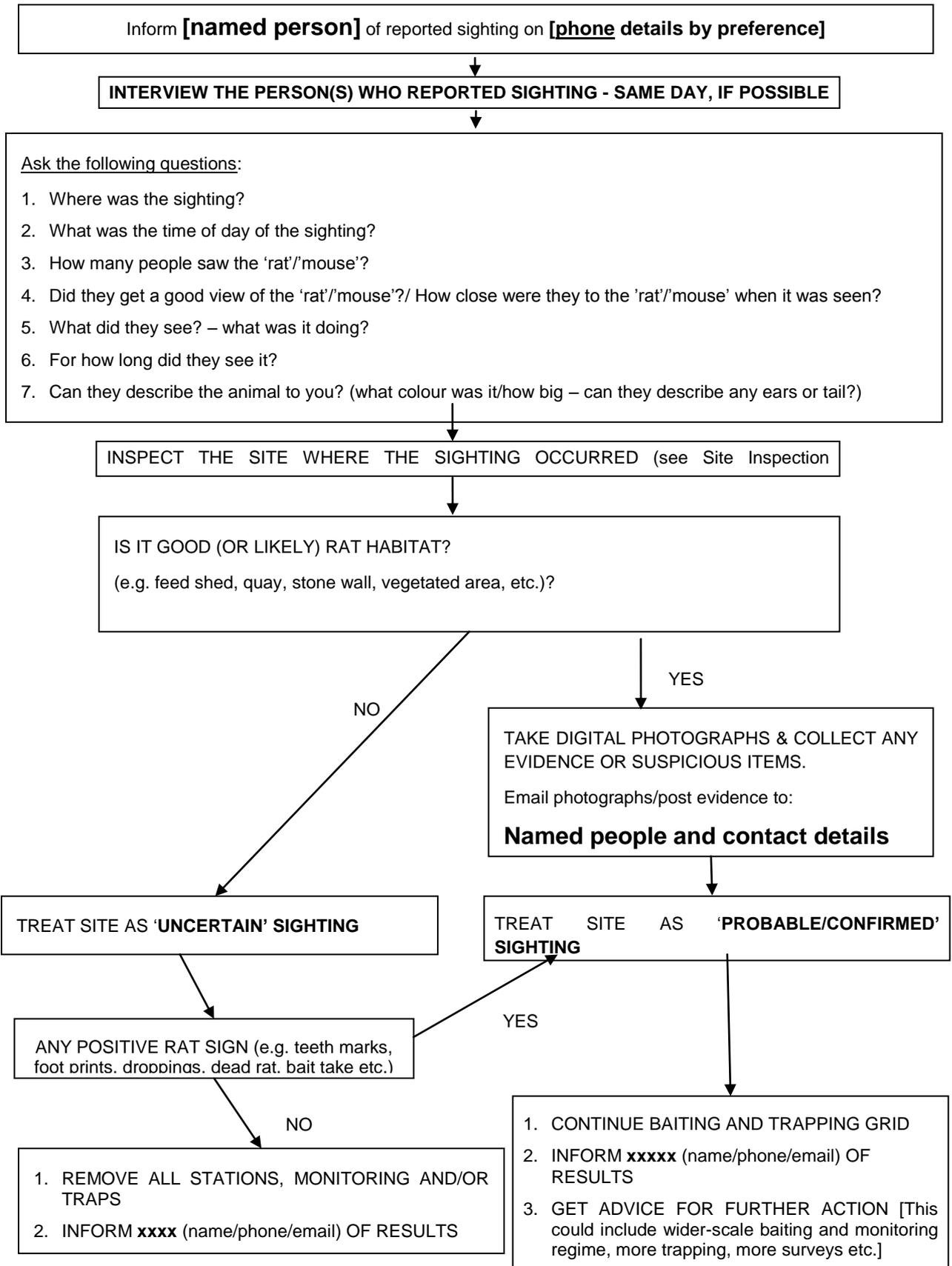
Table A4.10 - Rodent Incursion Kit contents

Item
Reference information - consider having laminated copies
Biosecurity plan *
Map of island
Map and description of GPS locations of permanent monitoring devices / grid
Species identification material
Operating instructions (e.g. CPS, trail camera, traps, installing bait stations)
Contact details for experts *
Record keeping
Waterproof notebooks
Copies of maps for note-making (incl. some laminated)
Pens/pencils
Vivid marker pens
GPS (loaded with locations of stations) and spare batteries*
Compass
Data sheets for recording activity at traps/tracking tunnels/monitoring stations
Flagging tape (at least two colours)
Specimen containers (jars, zip lock bags) & labels
1 litre of 70% ethanol
Sharp knife or dissecting tools (e.g. scalpel, tweezers)
Digital camera and spare batteries*
50m tape measure
Detection
Tracking cards*, ink* & tunnels
Bait for tracking tunnels - peanut butter/oats, pieces of coconut, etc *
Indicator baits - chocolate/peanut butter/coconut wax, soap, coconut, eggs, chocolate *
Trail camera(s) and spare batteries*
Headlamps/torches & spare batteries*
Eradication
Snap traps and covers with length of wire for each trap to attach to anchor-point. Mouse and rat-sized if both species a risk.
Bait for traps – eg peanut butter* and rolled oats*
Wire and bait stations – sufficient to create correct grid size across island, if required
Second generation rodenticide*- replace every couple of years: has limited shelf-life
Self-sealing bags
Disposable gloves* for handling baits, traps or dead animals
Tools e.g. hammers, spades, pliers, nails, thin wire, thicker wire
1st Aid kit including blankets*
Boat & safety gear*
Rope access gear*
Two means of long-distance communications – two-way radio and/or satellite phone and/or emergency locator beacons, and spare batteries* or means to charge these.
Personal protective equipment
Tent and sleeping equipment (if no accommodation available on island)
Water* and cooking implements (take fresh supplies of food and water as well)
Generator and fuel (if no electricity on island)
Rodent-proof and waterproof containers for all equipment to be packed in

Table 4.11 – Example incursion response bait take form

	Date	1/1/14			Date	2/1/14
	Surveyor	Sophie Thomas			Surveyor	Sophie Thomas
Station	Bait taken	Notes		Station	Bait taken	Notes
A1	2 blocks	Rat droppings found (all removed)		A1	0 blocks	Bait in good condition
A2	0.5 block	Suspected crow interference. Block replaced		A2	0.25 block	Block collected for tooth mark identification
A3	0 blocks	-		A3	0 blocks	bait replaced as damp around edges
A4				A4		
A5				A5		
A6				A6		
A7				A7		
A8				A8		
A9				A9		
A10				A10		
A11				A11		
A12				A12		
A13				A13		
B1				B1		
B2				B2		
B3				B3		
B4				B4		
B5				B5		
B6				B6		
B7				B7		
B8				B8		
C1				C1		

6.3 Interview guidelines for sightings:





Have you seen mice/rats in the wild before / Do you have any experience with mice/rats?

What makes you think it was a rat/mouse?

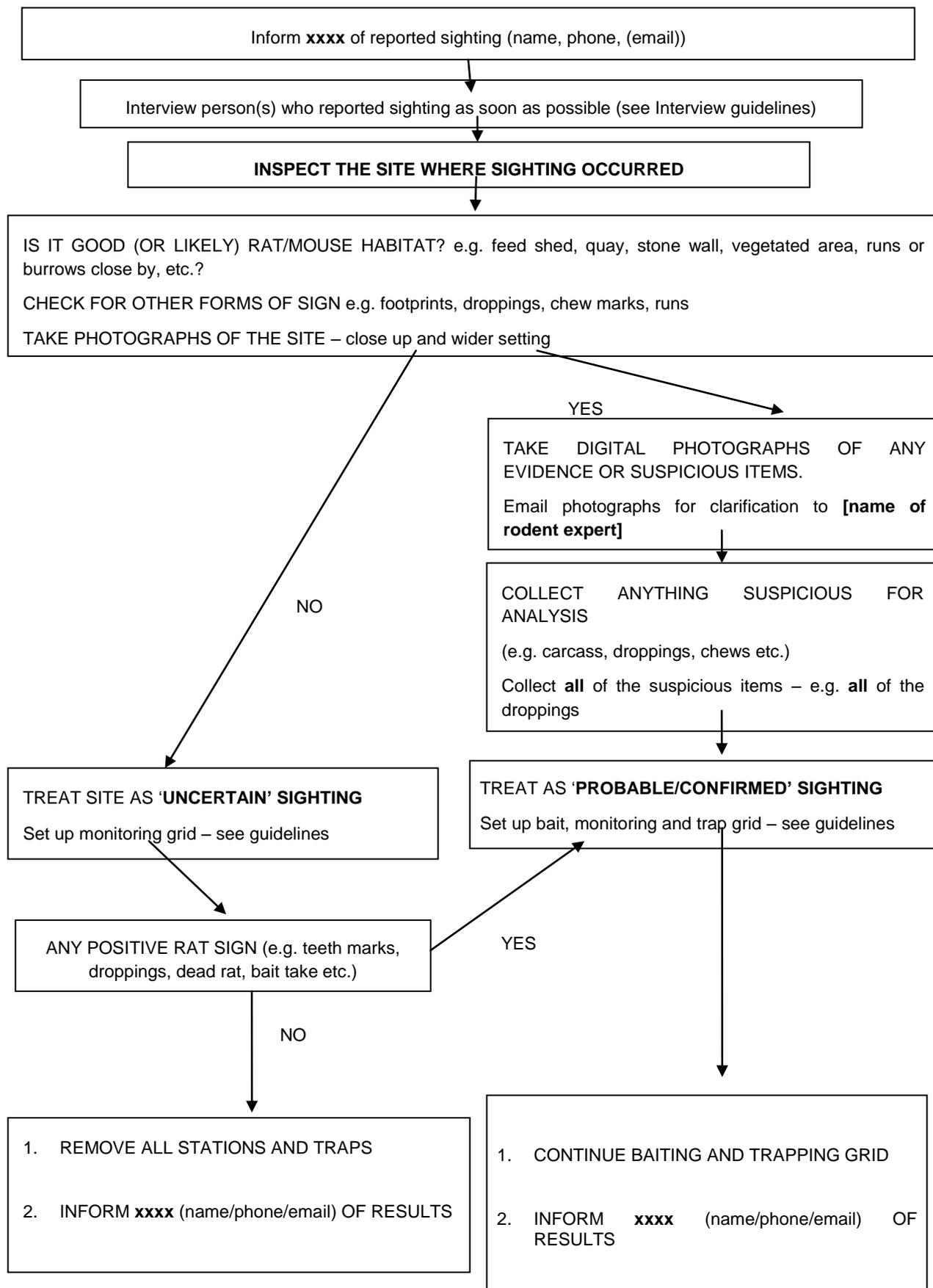
How sure are you that it was a rat/mouse?

Does the observer wish to be notified of outcome of the monitoring?

[Inform them that will take at least six weeks]

Image of brown rat compared to house mouse and Scilly shrew (Scaled, but not life size, from Bell *et al.* 2014)

6.4 Site inspection guidelines for reported sightings:

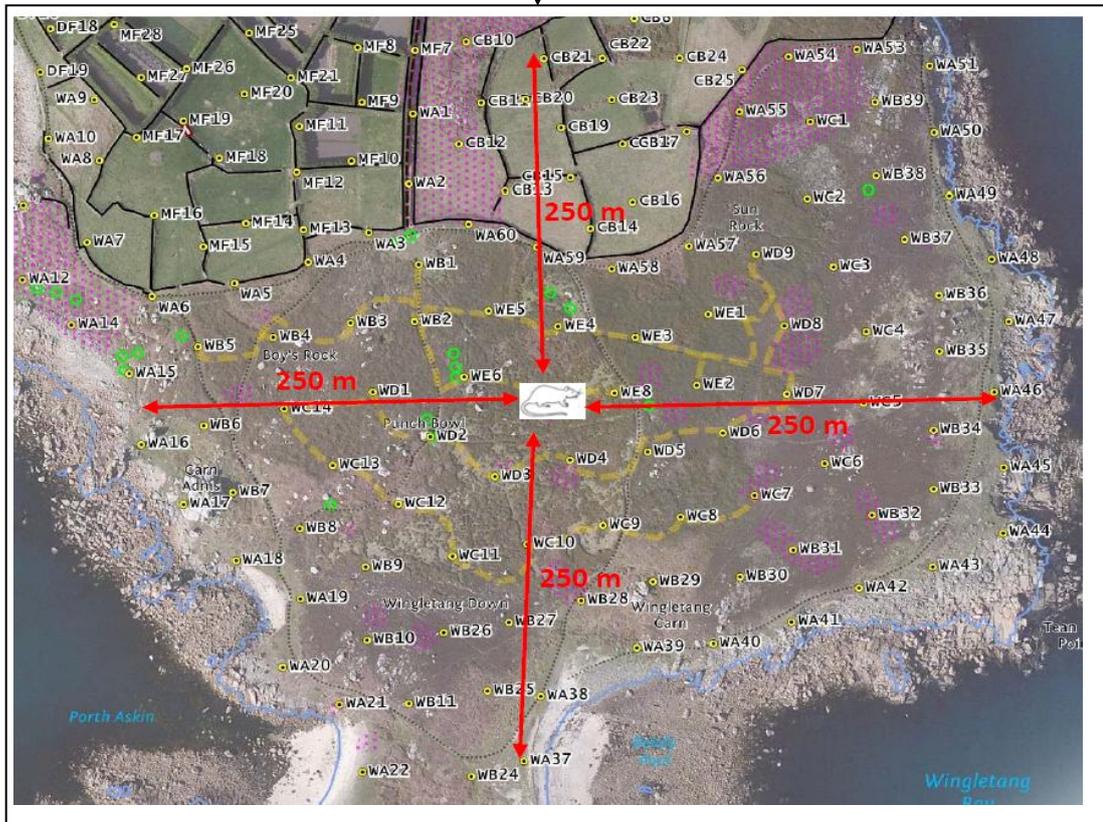


Guidelines for “uncertain/possible” sightings/ evidence:

Inform **xxxxx** of outcome of interview/site inspection (name/phone/email)

SET UP MONITORING GRID:

- Establish/bolster monitoring grid with stations 50 metres apart (closer if it is a mouse sighting) around the area of the reported sighting (use old bait station locations as mapped during the eradication operation for speed and ease of response)
- Spread monitoring stations to out up to 250 metres in all directions from sighting (terrain dependant).
- Put flavoured wax and/or tracking tunnels at each monitoring point. If you have more detection devices available, use them as well.
- **Check all points daily for three days, then once a week for four weeks**



ANY POSITIVE RAT SIGN? e.g. teeth marks, droppings, dead rat, monitoring take, etc.

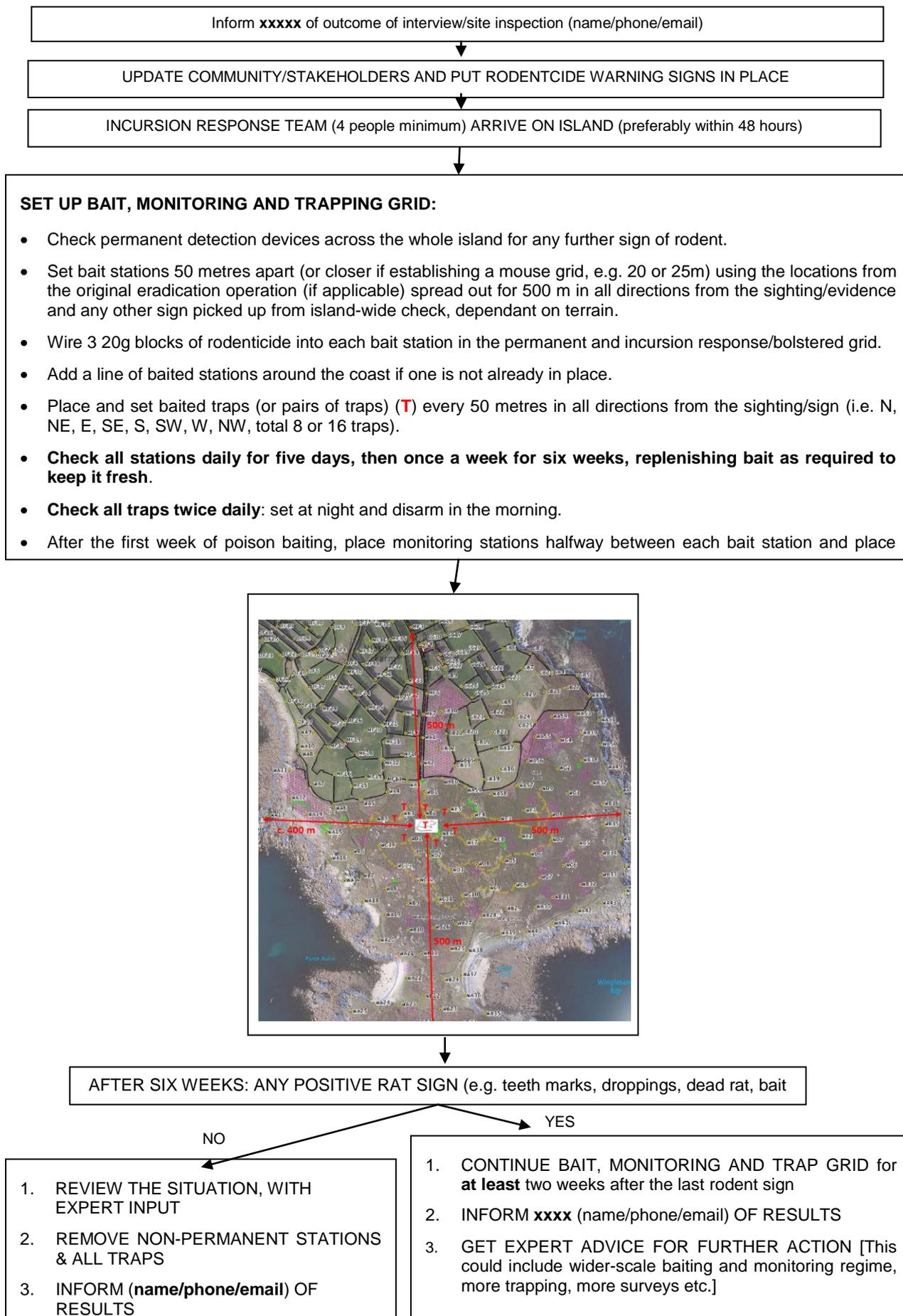
NO

YES

1. REVIEW THE SITUATION AFTER ONE MONTH, WITH EXPERT INPUT
2. REMOVE NON-PERMANENT MONITORING STATIONS
3. INFORM **xxxx** (name/phone/email) OF RESULTS
4. REMAIN VIGILANT

1. IMPLEMENT BAITING, MONITORING AND TRAPPING GRID (see guidelines for “probable/confirmed” sighting)
2. INFORM **xxxx** (name/phone/email) OF RESULTS
3. GET EXPERT ADVICE FOR FURTHER ACTION [This could include wider-scale poisoning and monitoring regime, more trapping, more surveys etc.]

6.5 Guidelines for “probable/confirmed” sightings/evidence and shipwrecks:



7 References and sources of further information

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