ANNEX 6: LOGISTICS AND EQUIPMENT

Contents

This document can be cited as: Thomas, S., Varnham, K & Havery, S (2017). *Current Recommended Procedures for UK (bait station) rodent eradication projects: Annex 6: Logistics and equipment* (Version 4.0). Royal Society for the Protection of Birds, Sandy, Bedfordshire.

1 Introduction

1.1 Logistical considerations

1.1.1 The logistical considerations for island restoration programmes are considerable. Even if the project island is easy to get to and has no cliffs, often the off-shore stacks that also require baiting have never been landed on – and for good reason. Adding winter conditions into the equation adds significant challenges to logistics as well as health and safety: supply boats may not be able to land for several days/weeks, delaying the operation and withholding food or equipment from the team. Rocks and vegetation will be slippery for much, if not all, of the time, adding to the risks of accessing coastal stations.

1.1.2 As well as sourcing the equipment and planning the logistics for the eradication operation team, you will also need to do this for the monitoring and evaluation team. You will also need to support all other project trips to the island, for example for the Feasibility Study.

1.1.3 Safety of the operations and monitoring teams is paramount and should be considered in a detailed Health and Safety Plan.

1.1.4 The teams also need adequate accommodation providing shelter and warmth, as well as provisions of food, clean water (for drinking, cooking and washing) and waste disposal facilities – the difficulty of providing these will vary considerably depending on the island. These aspects are not covered in more detail here. Seek advice if you are uncertain how to meet the needs of the operations or monitoring team.

1.1.5 Everything must have been thought of in advance and planned for. Timing is everything. You should plan for things to go wrong and build in sufficient contingencies in time, staffing and finances to cover this. Remember, '*the level of resourcing is 'whatever it takes'...To under-achieve eradication... means failure. The approach must be to over-achieve it*' (Broome *et al.* 2014).

2 Poison Bait: ordering, handling & disposal

2.1 Key considerations

2.1.1 It is crucial to consult experienced eradication experts when determining how much bait and which types will be required for the operation. The amount of bait required will vary depending on a number of factors including: island size, rodent density, rodent species, active ingredient, bait formulation, anticipated loss to weather/non-target species.

2.1.2 Get bait quantity calculations peer reviewed. Running out of bait before the eradication is complete is highly likely to result in failure.

2.1.3 A contingency of at least 10% (preferably 20%) should be added to the total amount in case of unforeseen circumstances (e.g. bait gets damaged in transport, some goes mouldy, gets wet, is spilled etc), or island size is underestimated (sounds unlikely, but it happens).

2.1.4 Quality control samples (toxin concentration, bait hardness) should be taken at the factory, but take samples on receipt and during the operation for this purpose, too. Quality control bait should be stored frozen for later testing if required. This may allow bait quality issues to be discounted if the operation is later found to have failed.

2.2 Bait calculation

2.2.1 Calculate island land area using a Geographic Information System (GIS) layer. Large water bodies will not need to be baited, but expect to place bait around the edges of the habitat. Ensure that all offshore islets and stacks are included in the calculations. Bait calculations have in most previous successful operations been based on actual map (planar) areas not on any 3D calculation of surface area. However, if the island is very steep or has a large number of gullies or valleys, then it is better to base bait calculations on the 3D area, or at least to add a substantial margin for contingency. Good GIS maps can be used to calculate 3D area.

2.2.2 Use a computer shape file of the island to overlay the required grid points. A bait station will be placed at each grid point. Use this information to check prior calculations on the amount of bait. **Do this early enough to allow the bait order to be amended.**

2.2.3 Consider areas that will require more intensive baiting than the standard grid chosen – e.g. greater densities will be required inside buildings, on cliffs, etc.

2.2.4 Ensure you carry out the same calculations for all offshore islets that need to be treated: islands and islets up to 2 km away from the ‘project island’ may need to be treated.

Table A6.1 – Calculating bait requirements (illustrative only).

Treatment Area	Details of Area	Bait Rate	Amount of bait required
Island size = 150 hectares Initial bait lay	Stations on a 50m x 50m grid = 4 stations per hectare = 4 x 150 ha = 600 stations A 30m x 30m grid would have ~12 stations/ha, and a 100 x 100m grid, 1 station/ha	Each station to have 150g (0.15kg) of bait **each round**. 4 stations x 0.15kg = 0.6kg/ha	0.6 kg/ha x 150 ha = **90 kg** (or 150g x 600 stations = 90 kg)
Replacement bait	At least 10 full-replacement rounds expected	Each station to have 150g (0.15kg) of bait **each round**	10 x 90 kg = **900 kg**
Special treatment areas, e.g. extra bait stations within buildings, around rubbish dump, around cliffs, etc	10 buildings 300 coastal stations: less regular access, so more bait placed each round but fewer rounds 2 offshore stacks with total 15 stations	300g per building, expect 20 rounds 450g per station, 5 rounds 450g per station, 5 rounds	300g x 10 x 20 = **60 kg** 450g x 300 x 5 =**675 kg** 450g x 15 x 5 **= 33.75 kg**
Sub-total			1758.75 kg
Contingency of 20%			351.75 kg
TOTAL amount of **primary bait** to be ordered			2110.5 kg Round up to **2150 kg**
Back-up bait	Entire project area (925 stations)	2 complete rounds @ 50g/station	50g x 925 x 2= **92.5 kg**
Back-up bait 20% contingency			**18.5 kg**
TOTAL back-up bait (only available in 10kg buckets)			111kg Round up to **120 kg**

2.3 Ordering bait

2.3.1 Once you know the volume of bait you require and in what form (e.g. pellet, block, gel) you need to order it. Discuss with bait manufacturers as early as possible, at least **six** months prior to your intended eradication start date. Bait has a limited shelf-life so you will want bait that is fresh.

2.3.2 You need to **order bait well in advance** of your operation because:

- Bait may only be made at certain times of the year and the factory may need to clean down equipment prior to manufacture (and so may prefer to combine orders in to one manufacturing run);
- You need to allow enough time for the bait to be delivered to your location (often it will be delivered to a main port before being shipped to the project location, but you may also be able to get it shipped directly to the location). Plan for shipping delays;
- Allow time for delays in clearing customs/ports. Establish what import or port duty taxes the project may be liable for so that bills do not accrue whilst bait sits on a quayside. You are likely to require permits from HMRC to import bait if it is not sourced from the UK.

2.3.3 In your order you need to specify:

- The total volume of bait that is required (including the contingency amount);
- Any specific requirements, e.g. **delivery in 10kg buckets is far preferable to the standard 25kg buckets/bags** – think of the people who will have to carry the bait daily across the island. Other specific requirements include adding a lure (e.g. peanut butter or chocolate, a change in diameter of bait size/hole placed through the bait);
- How the bait is to be transported, when, and to where;
- Consider whether you need to use sturdier pallets - heavy-duty pallets are advised if bait is to travel long distance by sea, or be handled a number of times before it reaches its destination; and
- Requirements of any laws or rules relating to the use of the toxin in the country in which it is to be used. Bait is not regarded as a hazardous good during transportation, although it is advised to check with the distribution company (and/or ferry company) and it will still require the Material Safety Data Sheet to be displayed.

2.4 Packing and transport

2.4.1 **Bait must be handled with care** to avoid crushing or contamination. Shrink wrap pallets for more secure transport. Bait can become unpalatable to rodents if stored with fuels, solvents and other potential contaminants. It is important that bait is presented to rats in the best condition possible to ensure high palatability. Take care to ensure that bait is not exposed to any materials which could affect its life in storage. Separate bait from fuel or other chemicals during shipping and storage to avoid contamination from spills. **Do not use contaminated bait**.

2.4.2 Cyclic heating and cooling of bait must be avoided: avoid placing or storing bait in direct or diffused sunlight to prevent condensation forming inside the buckets. This condensation raises the moisture content of the bait touching the bucket and encourages mould growth and bait degradation.

2.4.3 When transporting bait to the operation consider the following:

- Space requirements - how much room will the volume of bait you are going to use take up?
- Will you leave the bait on the pallets? (Pallets can be useful for keeping bait off the ground and for loading into the storage facility at the start of your operation.)
- Is the vessel transporting the bait rodent-free? – can you set up traps / bait stations onboard?
- How and where will the bait be unloaded – consider whether this will be by hand or with machinery?

2.4.4 If the bait is to be transferred to the shore by a smaller boat – how will you do this and how will you keep the bait dry? Don't break the seal on the buckets until the bait needs to be used. Carry tarpaulins / use barrels or other waterproof means if there is a chance the bait will get wet.

2.4.5 The condition of bait - hardness, intactness, moisture (want to avoid wet bait) should be checked by opening some of the buckets of bait before accepting delivery. Quality control **bait samples** should be taken at the factory and during the operation.

2.4.6 Undertake regular inspection of **bait** when in **storage** and take measures to minimise damage, especially from water leaks, condensation or attack by rodents or insects – i.e. by placing rat traps around bait and potentially treating the storage area with an appropriate insecticide (you may require a permit to do this and should complete an EIA and COSHH assessment for the use of the product). Bait storage on the island would ideally use an existing building but tents or plastic containers have been used successfully. Bait must be kept dry and free from contamination, rodent or insect damage whilst in storage to ensure it is in good condition and highly palatable when laid.

2.5 Disposal

2.5.1 Dispose of all bait responsibly.

2.5.2 If bait gets damaged or wet and cannot be used, separate it out and store in a sealed container clearly marked "unusable bait". Old bait should also be stored here.

2.5.3 When replacing bait in bait stations don't throw the bait away. Take it back to base and store in a sealed container clearly marked "unusable bait".

2.5.4 Have a system for disposing of old or damaged bait. **Consult with the relevant local authority to establish your obligations and options over bait disposal.** Disposal may be classed under hazardous waste and has to be incinerated at a suitable registered site, which has additional costs to consider.

2.6 Sourcing rodenticides

2.6.1 Use freshly manufactured bait where possible. Do not store for longer than recommended by the manufacturer. This ensures high bait palatability, which has a direct influence on eradication success. Old baits have been used successfully, but may be less palatable than natural food available to the target species at the time of application, so their use adds unnecessary risk to the project.

2.6.2 There are a number of rodenticide suppliers with products registered in the UK. Those listed below are part of the Stakeholder group working in partnership with the Campaign for Responsible Rodenticide Use.

- Barrettine Environmental Health;
- BASF plc;
- Bayer Crop Science Limited;
- Bayer Garden;
- Bell Laboratories Inc.;
- DuPont UK Limited;
- Killgerm Group Limited;
- LODI UK Limited;
- LiphaTech S.A.S.;
- PelGar International Limited;
- P+L Systems Ltd;
- Rentokil Initial plc;
- STV International Limited; and
- Syngenta Crop Protection AG.

2.6.3 If you plan to use a new supplier, take time to explain the differences between a control operation and an eradication project so they are aware they are dealing with a more time-constrained and meticulously planned operation than usual.

Table A6.2 - Contact details for rodenticide suppliers of previous UK rodent eradication projects.

Bell Laboratories, Inc.	Chaucer House, Chaucer Road, Sudbury, Suffolk, CO10 1LN t: 01787 379 295 e: emea@belllabs.com
BASF plc	Pest Control Solutions, PO Box 4, Earl Road, Cheadle Hulme, SK8 6QG t: 0161 485 6222
PelGar International Ltd.	Unit 13, Newman Lane, Alton, Hampshire, GU34 2QR t: 01420 80744 e: info@pelgar.co.uk
Barrettine Environmental Health	St Ivel Way, warmly, Bristol, BS30 8TY t: 0117 9672222 e: beh@barrettine.co.uk

3 Equipment

3.1.1 **The following lists in Table A6.3 and A6.4 are not comprehensive**, but give details of the core equipment that is likely to be needed during restoration projects. Many items bought for one phase of the project can be re-used in later phases.

3.1.2 The lists do not cover equipment for living arrangements such as temporary accommodation, heating, cooking or washing equipment, water purification etc. Neither do the lists include off-island transport requirements such as the main supply boats that will be needed (most likely regularly throughout the project) to ferry people, equipment and supplies to the project site/mainland. Helicopters may also be needed as part of the transport requirements, as will fuel for boats if you are chartering your own vessels.

3.1.3 Do not underestimate the frequency of boat trips that will be required during the eradication operation. Suitable boats and capable captains will need to be identified for the project. Any commercial operator(s) used will be required to have the current MCA licences and registrations for insurance purposes. Although no boat should sail when it is dangerous, you will need to find a boat which is seaworthy and can land on site during the anticipated winter conditions and a captain who is committed to the project and understands what is needed. Not being able to access the project site regularly risks the health and safety of the team as well as the project's chances of success.

3.1.4 Finally, the lists do not cover equipment or personnel that would be required if a captive population of a non-target species needs to be captured and housed. Seek specialist advice if your project has these requirements.

Table A6.3 – Equipment list for pre- and post-eradication monitoring (ecosystem response) e.g. bird, mammal, plant, invertebrate monitoring (generic 'starter' list only).

ITEM	NOTES
Notebooks	Waterproof types are best
Pencils	HB recommended (better than pens for writing in wet conditions)
Pens	Variety of colours is useful
Marker pens	Variety of colours is useful
Flagging tape	Helps locate monitoring plots – get hazard tape or fluorescent colours – variety of colour is useful
Marking poles/canes	8 ft bamboo poles (to be cut in half) to help locate bait stations and monitoring plots
Markers	2 inch white plastic tags, for numbering and monitoring burrows / plots etc.
Tape recorders	For determining burrow occupancy of nesting seabirds
Burrowscope (endoscope)	For determining burrow occupancy of nesting seabirds
Pitfall traps and antifreeze (to fill traps) Malaise traps	To collect invertebrate and moth/flying insect samples
Ethanol or suitable preserving fluid	To preserve invertebrates collected in pitfall traps and DNA samples for rats
Collection jars	To collect and store invertebrates / samples
Callipers/scales	/other measuring equipment
Mist nets *For use with licensed BTO ringing permits only*	And associated equipment: bags, rings etc.
Binoculars	To assist with bird surveys
Live traps and baits	E.g. Longworth traps for small mammals
Tracking tunnels	And cards/ink/lure – e.g. for small mammals
Sealable plastic bags	For samples
Microscope	To identify invertebrates
Digital camera	To take photo record at each photo point (e.g. fixed point vegetation plot) and for species identification
Trail camera	For confirmation of presence of elusive species
Plant press	To preserve plant samples
Rope and tent pegs	To mark count plots, 1 metre rope to use as diameter marker and tent peg to mark centre of plot
Maps of island	Laminated copies are recommended
GPS	To record burrows/colonies/other monitoring plots as waypoints, for production of GIS linked maps and database
Mobile/satellite phones (also consider marine VHS)	For maintaining contact with mainland/support team
First aid kits	Field type for each team member and more substantial ones for base
Emergency blankets	Emergency or safety blanket
A4 paper	A4 paper for reports or maps
Laptop(s)	For data entry, analysis and reporting
Generator and/or solar units	If no electricity supply on the island

Table A6.4 – Equipment list for eradication operation.

1. General (for use in all stages)	
Vehicles	Landrover / Quad bike and helmets / Trailer for use in distributing bulky/heavy equipment/dropping personnel off at baiting transects – particularly essential on larger islands. *Note: Consider consent required and protected areas.*
Boats & fuel	For accessing off-shore stacks/islets
Laptop	For data entry, data storage, GIS mapping, analysis and reporting
Printer	Production of daily bait take maps, public information etc.
A4 paper	A4 paper, for reports, information, letters or maps
Maps	Enlarged maps of project area
Notice board/whiteboard	For team notices, daily locations of team, details of briefing times, personnel 'in/out'.
Laminator	To produce field maps for team and community notices
Laminator sheets	Plastic pockets for laminating A4 sheets
Marker pens	Permanent marker pens, good quality and variety of colours, to number plastic tags etc.
Notebooks	Waterproof notebooks
Pencils	HB recommended (better than pens for writing in wet conditions)
Pens	Biros – variety of colours recommended
Mobile/satellite phones	For maintaining contact with mainland/support team
Dumpy/bulk bags	For transporting bulky equipment
Radios	Hand held (line of sight) radios for communication of team whilst in the field
GPS	For production of GIS linked maps of bait and monitoring stations
First aid kits	For each team member in the field and more comprehensive kits at base
Safety blankets	Emergency or safety blankets
Skin sanitation station	For cleaning hands after using bait and traps (e.g. Deb products)
Nitrile gloves	Nitrile gloves, thick surgical gloves, for handling bait and rodents - 100 per box, get boxes in different sizes *Note: Check with team for allergies and provide alternatives if required.*
Personal Protective Equipment	E.g. wet weather gear, suitable footwear for each field team member
Whistles	For team members to raise alarm if in trouble
High-visibility jackets	For safety (if required)
Pocket knives	For variety of uses in the field – e.g. maintenance of bait stations
Thermos	For assisting with keeping warm when in the field
Generator and/or solar units	For islands with no electricity/in case of extended power cuts
Appropriate tool kit for constructing wooden rodent motels (e.g. saw, hammer, etc.)	For construction of rodent motels/other equipment *Note: May be more effective to construct off-site in some cases*
Hammer	For construction of rodent motels/other equipment
Nails/ screws	For construction of rodent motels/other equipment
Hinges	For construction of rodent motels/other equipment
Plywood	For construction of rodent motels/other equipment

2. Pre-eradication	
Rat/mouse kill traps	For DNA sample collection and provision to households to reduce bait use prior to the eradication operation – e.g. x 150 or more if greater numbers of households.
Trap covers	Wooden box covers or commercial plastic covers – e.g. x 75 if only placing traps in pairs, more if not or greater number of households.
Non-toxic lure	E.g. peanut butter and oats
Collection jars & associated equipment	To collect and store DNA samples – **see Annex 2 for equipment list** – e.g. x 50
Compost bins	Rodent-proof, to replace unsuitable bins at private properties – as many as households/businesses
Rubbish bins	Rodent-proof, to replace unsuitable waste storage at private properties – as many as households/businesses
3. Rat eradication phase	
Bait stations	100mm diameter, corrugated pipe – each station is 750mm in length, plus extra needed to make lids (approx. 1m of piping makes 10 lids)
Fencing wire	To secure station and bait, and make crow clips/adjustments to keep non-target species out, 6mm grade – allow 4m per station
Marking poles	8ft bamboo poles (these will be cut in half) – one pole per two stations
Flagging tape	Hazard tape – bright colours so can see next station in poor visibility. Get three colours so can distinguish end of transects or routes through vegetation from stations
Plastic tags	2inch square, holed, for numbering bait stations – one per station
Poison labels	Poison labels (“poison, do not touch”) – one per station
Danger labels	Danger labels (“trap, danger, do not touch”)
Rodenticides	At least two different types, including at least one Second Generation (SGAR)
Vitamin K1	Vitamin K1, both injections and tablets - antidote for pets and other non-target species – ensure you have more than enough doses – consider worst case scenario
Batteries	Rechargeable batteries for headlamps etc., including recharge unit
Fixed access ropes	Fishing grade for fixed access ropes, 50 m coils
Climbing ropes	Climbing rope, 50 m, 100 m, 200 m coils
Metal stakes & mallet	For pinning ropes, 1 m
Harnesses & helmets	For climbing
Other climbing gear	Stops, ascenders, descenders, rope sleeves, karabiners, pegs, bolts, slings etc.
Rodent-proof containers	For transporting and storing food supplies

4. Intensive monitoring phase, long-term monitoring and final check	
Fencing wire	To make monitoring pins, 5 or 6 mm grade – allow 30cm for each monitoring point
Marking poles	8 ft bamboo poles (these will be cut in half) – one per two monitoring stations
Flagging tape	Bright coloured
Plastic tags	2 inch square, holed, for numbering monitoring stations – one per station
Plastic bags	Self sealing ('Ziploc' bags) 25 ml, to collect samples and unclear monitoring tools (e.g. wax blocks or soap with ambiguous or unclear marks)
Tracking tunnels	Tracking tunnels, cards, ink & lure e.g. peanut butter
Wax tags™	Commercially available, two flavours
Plain unscented candles	1. Full length, white, for melting down to make flavoured wax – pack of 12 makes approx 60 small or 30 large blocks 2. 50mm lengths for plain candle detection devices or wax beads
Soap	Small hotel type (approx. 25 x 40mm), natural, unscented
Cocoa powder and other flavours (peanut, aniseed, coconut etc.) Pots / stirrer Silicon muffin trays Gas + cooking ring Pots / stirrer	For making flavoured wax. Good quality cocoa powder, peanut butter or essence, creamed coconut or essence etc for making flavoured wax
Trail cameras	To verify suspicious sign/behaviour of residual rodents
Cordless drill	Rechargeable drill, for making holes in all monitoring items
Drill bits	Various sizes (6 mm)
5. Biosecurity	
Equipment needed as for: **3. Eradication and** **4. intensive monitoring.** Incursion response requires establishment of grid and monitoring as with eradication phases. See also Incursion response kit details (Annex 4). Also needed are:	
Permanent wooden bait stations	Wooden boxes (stained/weatherproofed), hinged and lockable, individually numbered, warni labels, etc.
Permanent plastic bait statior	Commercial, lockable stations, individually numbered, warning labels etc.
Flavoured wax	Make large supply during rat removal and intensive monitoring phase
Rodenticide bait	SGAR wax blocks – to be replaced every two years due to limited shelf-life
Storage area	Secured with a lock
Kill traps and covers	For deployment in case of confirmed sighting
Instruction sheets	Detailing the chain of command for decision-making in response to potential sightings and confirmed incursion
Rodent-proof containers	For transport of goods to the island