

Feasibility Study for the eradication of brown rats (*Rattus norvegicus*) from Bryher, Tresco, St Martin's and associated uninhabited islands, Isles of Scilly

2024 Update

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Executive Summary

1. The Isles of Scilly comprise some 128 separate islands in total, ranging from 0.0006 to 655ha. Brown rats *Rattus norvegicus* have been successfully eradicated from the joined islands of St Agnes and Gugh (146ha) and are also absent from nearby Annet as well as a number of other smaller islands in the group. However, brown rats are found on all of the other inhabited islands and many of the uninhabited islands. Rats are causing significant negative impacts on the islands for both humans and wildlife. As well as preying upon a wide range of animal and plant species, including the islands' iconic seabird species such as Manx shearwaters *Puffinus puffinus* and European storm petrels *Hydrobates pelagicus*, they are known to carry a variety of diseases, to damage buildings and to consume or contaminate human and animal food. Controlling rodents and replacing things they have damaged has a significant financial cost to island residents.
2. **A feasibility study produced in 2011 (Bell 2011) found that the removal of rats from St Mary's was not feasible using current methods, but that the removal of rats from Bryher, Tresco and St Martins is feasible using the best practice methodology for ground-based rat eradication projects.** However, due to the proximity of these islands (well within the swimming distance of brown rats) all three would need to be cleared at the same time, along with around 35 uninhabited islands. A further feasibility study in 2017 (Varnham & St Pierre 2017) focussed on the potential removal of rats from this group of islands. The 2017 study updated and expanded the 2011 report whilst identifying issues that needed further investigation.
3. **This current report explores these outstanding issues in further detail. We conclude that the eradication of rats from Bryher (132ha), Tresco (299ha) and St Martin's (240ha) and the uninhabited islands remains feasible.** While the total area to be covered (c. 800ha) is well below the size of the largest successful ground-based projects, the inclusion of three inhabited islands and multiple uninhabited islands will make this one of the most logistically challenging rat eradication projects attempted globally. It can only go ahead with an extremely well-organised team, in which reliable boat transport from highly experienced local operators will be essential. This report includes the proposed staffing and equipment requirements of the project, along with an estimate of overall cost.
4. **The biggest risk to the long-term sustainability of the project is the likelihood of reinvasion, most likely from St Mary's.** Effective and costed biosecurity plans for the islands cleared of rats and strategies for securing the necessary ongoing funding must be developed before the eradication project proceeds. The estimated staffing and equipment requirements for setting up and maintaining ongoing biosecurity are included in this report.
5. **Full community agreement will be essential for any such project to proceed. The views of all island residents will need to be collected before the project can proceed to the full operational planning stage.** A survey of a sample of island residents showed very high levels of support for the project as well as a reasonable understanding of what such a project would involve for their islands, based primarily on their knowledge of the project on St Agnes and Gugh.

6. The issues considered here are divided into four categories: Strategic (community support, waste management and biosecurity), Technical (genetic analysis, dealing with key non-target species), Operational (accommodation, boat requirements, rodenticide options) and Financial. Of these, the Strategic Risks are those with the greatest potential to affect overall feasibility of the project as they are the most closely linked with gaining the support of key stakeholders, without whose approval the project could not proceed.

7. There is considerable capacity within the RSPB and IoSWT for planning and carrying out projects of this kind, mainly from people who have worked on one or more of the previous UK rat eradications. However, a world class Operations Manager will need to be contracted to oversee the actual eradication phase.

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1. Introduction

A feasibility study into the removal of invasive brown rats *Rattus norvegicus* from the Isles of Scilly archipelago was produced in 2011 by NZ-based Wildlife Management International Ltd, the company that later led the successful removal of rats from St Agnes and Gugh in 2013 (Bell 2011). Their study concluded that eradication from St Mary's was unfeasible due to technical reasons. The same report concluded that the eradication of rats from Bryher, Tresco and St Martin's was technically feasible but only if all three islands and the surrounding smaller uninhabited islands were treated simultaneously, as rats could swim between them. A further feasibility study was carried out by RSPB in 2017 (Varnham & St Pierre 2017), focussing on the proposed eradication of rats from Bryher, Tresco, St Martins and associated uninhabited islands, updating and expanding WMIL's previous document. That report supported the conclusions of Bell's previous study: that eradication from these islands remained feasible and that all the work would need to be carried out at the same time.

However, while the 2017 study concluded the project remained feasible, it raised a number of outstanding issues that needed further investigation. This report considers these outstanding issues in more detail and is intended for those involved in making decisions about the future of wildlife in the islands and specifically about the planning, execution and future implications of a large-scale rat eradication project. The current project development work has been carried out by a partnership including IoSWT, RSPB, and other key stakeholders such as the Council of the Isles of Scilly (CioS), The Duchy of Cornwall, Tresco Estate and The Isles of Scilly Steamship Company. This report should therefore be considered as an extension of the 2017 Feasibility Study and considered alongside the findings set out there. While there are still some elements requiring further work, this report can be used to inform future funding proposals, as well as providing updated information for island residents and other local and national stakeholders.

The details of the proposed project are set out in the 2017 study but, briefly, the proposed project involves simultaneously eradicating rats from Bryher, Tresco and St Martin's along with around 30 uninhabited islands. This will follow the best practice methods for UK ground-based island rat eradication projects (Thomas *et al.* 2017), involving a grid of rodenticide stations set out in a c. 50 x 50m grid across all islands, most likely using a second-generation anticoagulant rodenticide (SGAR) of the type used in almost all UK rat eradications to date. The operational phase typically runs for around six months between October and March in any given year, focussing efforts at the time of year when the natural food supply is at its lowest, with rodenticide typically being used from the November. There will be a long lead-in time ahead of the operational phase for the project team to get the islands ready for removing rats, working closely with island residents and businesses to minimise food and harbourage which could be accessed by rats.

The development of this feasibility study has also been informed by the experimental rat eradication attempt which took place on one of the archipelago's uninhabited islands, St Helen's in the winter of 2023-24 (Pearson *et al.* in prep). This trialled a different type of rodenticide, cholecalciferol, in anticipation of tighter restrictions around the use of SGARs from the end of 2024. As well as providing useful information about the efficacy of cholecalciferol, the project also provided valuable insights into the planning and execution of rat eradications on Scilly's uninhabited islands. These include considerations around boat transport, impacts of poor weather and sea conditions, and the problems associated with staff being unable to stay on islands overnight. These lessons will be incorporated into the resourcing for the multi-island project proposed in this feasibility study.

The issues considered here are divided into four categories: Strategic (community engagement and communications, waste management and biosecurity), Technical (genetic analysis, dealing with key non-target species), Operational (accommodation, boat requirements) and Financial. Of these, the Strategic Risks are those with the greatest potential to affect overall feasibility of the project as they are the most closely linked with gaining the support of key stakeholders, without whose approval the project could not proceed.

2. Strategic Issues

2.1 Community Engagement & Support

Aim: To develop an effective partnership, in which local residents, businesses and other stakeholders play a full role in the governance and design of the project, and its maintenance in perpetuity.

Community support is essential to operational success. This support must be for the operational phase of the eradication and, equally importantly, for the ongoing biosecurity measures which will be needed in perpetuity. We are working towards a high degree of community involvement in the project, looking for solutions which will give us the highest possible chances of success in eradicating rats while also benefiting local communities and other stakeholders. Initial discussions with island residents show generally high levels of support for the principles of the project but understandable concern about issues such as impacts of the project on daily life, possible impacts on non-target species and how the risks of reinvasion will be managed effectively. Actions so far include meetings with residents on all three off-islands included in the proposal, drop-in sessions in island shops and halls and visits to households interested in hearing more about the project. A questionnaire has been produced and distributed to households, including many door-to-door visits, to gauge levels of support and invite feedback on areas of concern (see Appendix 1). A list of FAQs has also been produced, with more information about the proposed project and answers to questions raised by island residents. There has also been engagement and awareness raising at local events, e.g. local fetes. Awareness of the Seabird Recovery Project has been raised through talks including six presentations given to universities, local schools and local community groups such as the Women's Institute. The project has also developed a strong ongoing social media presence, providing regular updates on the project. The co-design waste management workshops carried out on the Off Islands in September 2024 (see section 2.2 and Appendix 2) provided a very productive approach for structuring engagement with communities, as well as an excellent platform to re-engage with them on the proposed rat eradication project.

Actions remaining:

1. Develop community engagement plan to run over remainder of feasibility planning phase, with follow-on engagement plans should the Seabird Recovery Project move to the project development and fundraising phase
2. Identify viable mechanisms for community input to project governance

Implications for feasibility

Lack of community support could make the project unfeasible. All available expertise needs to go in to developing and carrying out an effective community engagement plan. While no entrenched opposition has yet been identified, that does not mean that full agreement can be assumed.

2.2 Waste Management on Off Islands

Aim: Review management of Off Island waste, identify and implement opportunities to minimise rat harbourage and access to food in ways that also benefit local communities.

Poor management of waste on islands will provide food and harbourage for both resident rats and those which may invade. Transport of food waste between Off Islands and St Mary's is identified as a major pathway by which rats may be moved between islands. There are opportunities here to work with Off Island communities, the Council of the Isles of Scilly (CIOS), waste management contractors and transporters to find solutions that leave lasting benefits for island residents. Waste management is identified by Off Island communities as a crucial issue. Dealing with this issue is therefore essential to building community confidence in the sustainability of the proposed eradication project, as well as reducing the rat populations on the Off Islands and the chances of invading rats becoming established. In September 2024 waste management co-design workshops were held on St Agnes, Bryher, St Martin's and St Mary's to assess the local communities' views on the topic and begin to identify solutions. These workshops were carried out as a co-design process, led by Professor Jon Ensor of the University of York and George Goldberg of the Isles of Scilly Community Venture CIC. The authors of this report also took part to learn more about current food waste management practices, identifying challenges and opportunities for the proposed rat eradication project. See Appendix 2 for a summary of the workshops and their attendance.

The three Off Islands included in the proposed rat eradication project have different waste management practices, though for all three the majority of waste is ultimately taken to St Mary's and from there on to the mainland for final processing. The waste management contracts on the Off Islands are up for renewal shortly. The following summary is taken from the CloS website (<https://scilly.gov.uk/environment-transport/waste-recycling/island-waste-recycling-sites>)

The Council of the Isles of Scilly manages waste and recycling on St Agnes, Bryher and St Martin's from householders and businesses. All waste and recycling is managed through contracts which are delivered by third party contractors on each off island.

The Council processes and arranges for the final disposal of residual waste arising from Tresco Estate under a separate contract, with daily waste operations carried out by the Estate.

On each off island where waste is managed by the Council under contract, there is a dedicated waste management 'bring site' where all materials are stored prior to being transported to St Mary's for processing. St Martin's is the only off island to benefit from a kerbside waste & recycling collection service.

There are also differences in the management of organic waste between the three islands, the most concerning element of waste management from the point of view of the rat eradication. On St Martin's many residents and some businesses dispose of food waste and garden waste on their own compost

heaps or use green cones (<https://www.originalorganics.co.uk/green-cone-food-digester-2>). On Bryher kitchen waste (excluding plate waste and animal products) is collected from several commercial food sites by a community member and composted, but general home composting is discouraged as it is considered likely to lead to the spread of rats. Any food waste which is not composted is taken to the tip in black (domestic waste) or grey (commercial waste) bin bags, along with other non-recyclable materials. On Tresco all food waste is disposed of in an aerobic digester. The resulting digestate is still a potential food source for rats and needs further composting to turn it into a compost which is not attractive to rats. On all three island piles of green waste are present, which may also present an attractive habitat for rats.

Food waste from businesses (hotels, pubs, restaurants and cafes) is managed in a variety of ways. In addition to the composting mentioned above, some have food waste collected from their premises and taken to the island waste management site, others put it in mixed waste bags and take it to the site themselves. Some businesses showed an interest in using an anaerobic digester should one be available, either on island or sending their food waste to St Mary’s should a digester be sited there in the future. A further round of workshops is planned for spring 2025 to further refine improvements to waste management which meet island communities’ needs.

Waste management measures therefore need to be taken at a range of levels, including individual households and council-operated waste collection, storage and removal. Table 1 identifies areas where rats could have access to human food or food waste and suggests ways in which this access could be reduced.

Table 1: Potential ways in which rats could be accessing food waste and suggested actions.

Site	Routes by which rats can access food/ food waste	Suggested actions
Domestic properties	<ul style="list-style-type: none"> • Storage of food • Growing food in gardens • Composting household and garden waste • Storage of food waste prior to collection 	<ul style="list-style-type: none"> • Rodent-proofing of buildings and food storage containers • Reduce garden waste and undergrowth • Compost household/ garden waste in rodent proof containers – OR use community composting schemes • Storage of food/ garden waste for collection in rodent proof containers
Agricultural premises	<ul style="list-style-type: none"> • Storage of animal feed and bedding materials • Growing crops 	<ul style="list-style-type: none"> • Rodent-proofing of buildings and containers in which animal feed/ bedding is stored

		<ul style="list-style-type: none"> • Keep areas around crops as clear of undergrowth as possible – minimise availability of food and bedding material
Commercial premises involved in producing or serving food	<ul style="list-style-type: none"> • Storage of food • Composting food waste • Storage of food waste prior to collection 	<ul style="list-style-type: none"> • Rodent-proofing of buildings and food storage containers • Process food waste on site using appropriate composter/ digester unit • Storage of food waste for collection in rodent proof containers
Waste Management Sites	<ul style="list-style-type: none"> • Storage of domestic and commercial food waste (delivered to site in bin bags, stored in dumpy bags) 	<ul style="list-style-type: none"> • Rodent-proofing of containers in which food waste is stored • Keep waste management sites as free of rat harbourage as possible – project will provide resources to clear away as much clutter from island as possible

Future actions

1. Continue waste management co-design process with island residents to identify acceptable and effective ways to manage food waste, resulting in benefits to islanders as well as reducing food availability to rats.
2. Continue work to identify equipment and other resources that the project could provide to Off Island communities to improve management of waste.
3. Plan island clear out days with local community members – days when island residents, supported by staff from IoSWT and RSPB (and CloS?), can get rid of unwanted items or bulky waste, via launch or landing craft. This may need to be repeated several times in the run up to the operational phase of the eradication.

Implications for feasibility

The availability of food waste, as well as non-food waste which could be used for harbourage, is a risk to the success of the proposed rat eradication project. Developing effective food waste management methods, which meet the needs of island residents, will be essential to the success of the project.

However, these challenges should be manageable and need not pose an existential risk to the chances of a successful eradication.

2.3 Biosecurity at Penzance, St Marys, and the Off-Islands

Aims (Current): To keep St Agnes & Gugh rat-free, along with all other currently rat-free islands. Raise awareness of issues, improve overall biosecurity for the islands – rodent biosecurity is an umbrella for preventing movement of many species. Use rodent control and monitoring actions on Round Island and St Helen’s to raise awareness of the impacts of invasive rodents and to promote good biosecurity practice.

Aims (Post-eradication): As above, but to keep all included islands rat-free, using trained dedicated biosecurity staff, conservation detector dogs and island volunteers.

Robust and properly-resourced biosecurity measures are essential to maintaining the rat-free status of islands – both those which are currently rat free and those that should be rat free after the proposed eradication project. Biosecurity refers to all actions taken to reduce the chances of invasive species (in this case focussing on rats) becoming established or re-established at a specific site. It includes three key stages – firstly, preventing new arrivals reaching the site, secondly, routine surveillance to provide early detection of any which do arrive and, thirdly, incursion response plans in place to respond rapidly and effectively to any invasive species which are found. In general, actions focusing on prevention are the cheapest and easiest, while responding to incursions - or worse, having to repeat eradications if new populations become established - are considerably more expensive and complex. While there is much to be learned from the experience of keeping St Agnes & Gugh rat free for the past ten years, all of the islands are different and have their own biosecurity challenges. It must be recognised that St Agnes is extremely lucky to have remained rat free on the tiny budget available for biosecurity – the fact that it has done so is largely down to the committed band of local residents acting as Seabird Heritage Volunteers, carrying out monthly checks of monitoring stations and reporting any concerns.

While the biosecurity phase should aim to build similar teams of volunteers on the other Off Islands it should not be assumed that the exceptional success of the volunteer team on St Agnes will automatically be repeated on the other islands. Should the proposed eradication go ahead, all four inhabited islands should be part of a well-resourced, fully staffed, ongoing biosecurity effort. Any resources and actions available for use on Bryher, Tresco and St Martins should also be extended to St Agnes.

If the proposed eradication goes ahead biosecurity on St Mary’s will need to be stepped up considerably to reduce risks of rats being taken back to the Off Islands. Detecting rats in cargoes destined for the Off Islands should start as early as possible in their journey, so biosecurity measures in Penzance should also be included. Some measures have already been put in place in Penzance and St Mary’s, including some rodent control at both sites, and a willingness to engage with biosecurity training. A range of resources will be required to maintain rodent-free status, including routine surveillance using tools such as non-toxic wax chew blocks and tracking tunnels, the use of conservation detector dogs and handlers, and thermal imaging cameras. The trial eradication on St Helen’s in 2023-24 provided an excellent opportunity to trial some innovative rat surveillance methods, including trail cameras able to transmit photos wirelessly, allowing them to be downloaded remotely. The current Biosecurity For England project, a legacy of the highly successful Biosecurity For

LIFE project, has recently purchased some additional monitoring tools to trial on Scilly, including an AI enabled thermal imaging camera which sends real-time alerts to staff when it detects a rat. Slightly more prosaically, they have also funded a heavy-duty automated mayonnaise dispenser for use in conjunction with trail cameras, in order to provide a long-term attractant to increase the chances of detecting rats at low densities.

Island communities will be vital in achieving effective long-term biosecurity to protect their local environments. Biosecurity will be needed in perpetuity so it is essential that the project partnership thinks now about what will be needed and how it could be funded. An integrated approach will be vital, including actions at Penzance and St Marys as well as on the inhabited and uninhabited islands included in the eradication project and those which are already rat-free. Both initial set up and annual running costs will need to be included, including an asset replacement plan for dealing with depleted, worn out or expired items.

The Biosecurity For England project is able to offer support to the development of biosecurity in Scilly in the following ways:

- Money for equipment for the SW incursion response hub (covering Scilly and Lundy) to bring it in line with the other UK hubs managed as part of Biosecurity for LIFE's legacy projects
- Draft biosecurity plans for Round Island, St Helen's, Tresco, St Martin's, Bryher and the uninhabited islands. Annual review of St Agnes and Gugh and Annet biosecurity plans to keep up to date with current situation and thinking.
- A conservation detection dog (CDD) visit once per year to carry out routine surveillance, cargo checks and engagement activities including an event with the St Agnes and Gugh community (this is in addition to the conservation dog capacity proposed as part of the proposed rat eradication)
- Boat operator training on St Mary's
- Country-level discussions with Trinity House to ensure biosecurity is included in their protocols, as has been achieved in Scotland with the Northern Lighthouse Board.
- Joint management of the SW incursion response hub volunteers and input into training required.
- Trialling of a thermal camera drone to be used in incursion responses (subject to local rules on drone flying) as these have been shown to be very effective at detecting warm bodied animals at low density. This technology could have a role in the later stages of the eradication project as well as in ongoing biosecurity.

2.3.1 Outline of biosecurity needs

Table 2 sets out the likely staffing needs of the ongoing biosecurity phase. Four staff will be required – a Biosecurity Manager, Biosecurity Officer and two Conservation Detector Dog Handlers. Two trained conservation detector dogs will also need to be recruited. The relationship between dog and handler is very important, and for highest levels of accuracy each dog should have a primary handler. However, it would be useful if the Biosecurity Manager and Officer could also undertake detector dog handler training, enabling some degree of detector dog capacity to continue even if one of the primary handlers is unavailable.

Table 2: Staff required for ongoing biosecurity work on Scilly. These roles will need to continue in perpetuity

Role	Responsibilities
Biosecurity Manager	<ul style="list-style-type: none"> • Oversight of biosecurity project • Management of other biosecurity staff and their work programmes • Planning community engagement and communications strategy • Building and maintaining relationships with partners and key stakeholders (e.g. Duchy, Steamship Company, Penzance Harbour, CloS, Island communities) • Fundraising to keep project going • Management of incursion responses • Ideally trained as auxiliary dog handler
Biosecurity Officer	<ul style="list-style-type: none"> • Carry out community engagement and communications on Scilly and on Penzance • Routine surveillance on islands, alongside island volunteers • Recruitment and training of biosecurity volunteers on Scilly • Training of harbour staff and boat crews on Scilly and in Penzance • Engage with biosecurity projects worldwide to get latest information on best practice tools and techniques • Lead incursion responses on the ground as required • Ideally trained as auxiliary dog handler
Conservation Detector Dog handlers (2)	<ul style="list-style-type: none"> • Routine surveillance on St Mary's Quay of all cargo headed to Off Islands and all locations where this cargo is stored – one dog will need to be on the quay every time a boat is taking cargo to the Off Islands • Monthly routine surveillance on Off Islands • Occasional routine surveillance on uninhabited islands • Community engagement and education events • Taking part in intensive surveillance (in response to unconfirmed rat sign) and incursion responses (responding to probable/ definite rat sign) as needed • Ongoing maintenance training to ensure dogs and handlers remain motivated

The three stages of biosecurity – prevention, routine surveillance and incursion response will require a suite of co-ordinated actions across three key areas – Penzance Harbour, St Mary's and the rat-free islands. Inhabited and uninhabited rat-free islands will require different actions. Table 3 summarises the actions required in each of these three areas at each stage of the biosecurity process.

Table 3: Biosecurity actions

Stage	Site	Actions required
Prevention	Penzance	<ul style="list-style-type: none"> • Conservation detector dog checks at Penzance harbour and on Scillonian (1/ week) • Ongoing rodent control around the harbour • Training for harbour staff on recognising rat sign on cargo, in areas where cargo is held and on vessels travelling to Scilly
	St Mary's	<ul style="list-style-type: none"> • Ongoing rodent control at St Mary's quay • Consider rodent control on northern coasts of St Mary's to reduce likelihood of rats swimming to rat-free islands • Routine checks with detector dog of any boats carrying cargo to Off Islands • Training for harbour and boat staff on recognising rat sign on cargo, in areas where cargo is stored and on boats travelling to Off Islands • Public information and training events for island residents
	Inhabited Off Islands	<ul style="list-style-type: none"> • Implementation of ongoing food waste management • Rodent-proof area near quay where suspect/ high risk cargo can be stored awaiting further checks • Training for island residents and anyone handling cargo coming from St Mary's or elsewhere in recognising rat sign and knowing what actions to act • Public information and training events for island residents • Biosecurity maintenance camps – one each year on each Off Island – maintenance and repair of all kit, review what's working, what needs changing, trial new technologies etc
Routine surveillance	Inhabited Off Islands	<ul style="list-style-type: none"> • Network of permanent monitoring stations in areas likely to appeal to rats (around coasts, near water sources, around sources of alternative food, e.g. areas where animal feed is stored or used). Checked monthly by biosecurity staff and/or island volunteers

		<ul style="list-style-type: none"> • Routine checks with detector dogs on each island, at least once per month • Training for island residents in looking out for rat sign and encourage reporting of any suspicions relating to rats
	Uninhabited islands	<ul style="list-style-type: none"> • Checks with detector dogs when feasible (1-4 times per island per year, depending on accessibility) • Permanent monitoring stations/ rodent motels in areas
Incursion response	Inhabited islands Uninhabited islands	<ul style="list-style-type: none"> • Requires full incursion response as set out in UK best practice – grid of bait stations for 500m in all directions from the confirmed/ probable rat sign • Supported by South West England Incursion Response Team and equipment hub – can provide volunteer staff • Scilly can establish its own incursion response hub using materials repurposed from the eradication – stations, monitoring equipment etc • Plans will need to be developed for how large-scale incursion responses would be funded – these could cost many thousands of pounds

Future actions

1. Develop a costed biosecurity strategy including plans for staffing and funding, and biosecurity plans for all the rat-free islands
2. Continue to monitor developments in biosecurity surveillance and incursion response equipment and methodology

Implications for feasibility

Setting up and maintaining effective biosecurity measures will be an essential part of the project planning process. Effective biosecurity – both in prevention and in responding to incursions - will be an enormous challenge and will require a high degree of ongoing focus and commitment. The biggest foreseeable risks at this stage are securing long term funding and commitment from key stakeholders. This needs to be a central element of the project development process, along with developing a plan for how to maintain and nurture this commitment in the future.

3. Technical Issues: Genetics and non-target species

3.1 Genetic work – testing for rodenticide resistance and identifying populations

Aims:

1. To determine whether there is likely to be resistance to either bromadiolone or difenacoum on any of the islands included in the eradication project
2. To get genetic profiles from rats on as many project islands as possible, as well as St Marys (not included in eradication) and Penzance to enable the project to assess the origins of rats later found on islands believed to be rat-free

Genetic resistance to anticoagulant rodenticides is known to occur in the Isles of Scilly – one of 25 rats tested prior to the St Agnes project was found to carry such a gene (although this did not ultimately lead to problems in choice of rodenticide). The highest risk of resistance is on the inhabited Off Islands where there is a history of rodenticide use, rather than on the uninhabited islands, but ideally rats from as many islands as possible should be included. The project will therefore need to test for rodenticide resistance as widely as possible. We have been in contact with the South East Technological University (SETU) based in Waterford, Ireland, where researchers have the capacity to test for rodenticide resistance, who have advised us on next steps. They recommend testing the first sample of rats (c. 100 individuals from different sites) as soon as possible, to identify whether certain anticoagulants can be ruled out at this early stage, and further samples closer to the start of the operational phase to see if any resistance has developed in the interim. SETU have provided a protocol for the collection and storage of rat tissue samples.

It is also important to collect samples throughout the project islands and from areas where reinvading rats might originate (in this case St Mary's and Penzance). These can be analysed for the presence of short, specific DNA sequences ('microsatellites'). Different populations will have different, characteristic combinations of microsatellites and they can therefore be used to determine whether rats found on islands post-eradication are survivors of the original population or have come from elsewhere. Population testing is not necessary at this early stage but any samples collected for resistance testing should be kept in secure conditions so that they can be tested at a later date. Further samples should be collected as the project progresses as this will allow more detailed genetic profiles of different populations to be established. Although not relating to feasibility, these samples could have a wider scientific interest in demonstrating the genetic connectivity of different island populations, giving insight into the degree of rat movement between islands.

Initial plans to send 100 samples to SETU by September 2024 did not come to fruition due to a lack of capacity within IoSWT to co-ordinate the necessary rat trapping and due to staff constraints SETU may not have the time to analyse samples. We recommend developing a plan to collect samples from the Off Islands to start in Spring 2025. We propose finding residents on Bryher, Treco and St Martins who would be happy to alert us to the presence of dead rats or who, with appropriate training, would be happy to use snap traps set in Protecta boxes provided by IoSWT to trap rats. IoSWT staff could then collect these and store tail tip samples safely until needed. Plans to collect samples from uninhabited off islands should be made around IoSWT plans for seabird monitoring or other planned activities.

Actions remaining

1. Collect samples for initial resistance testing from as many islands within the proposed eradication area as possible (it is not necessary to collect samples from St Mary's at this stage).
2. Develop plan with SETU or other site with relevant expertise to collect samples for further resistance testing nearer the start of the operational phase, and further samples for microsatellite analysis to characterise different rat populations within the eradication area, and from sites of possible reinvasion (St Mary's and Penzance).

Implications for feasibility

The risk of finding genetic resistance to one or more the anticoagulant rodenticides likely to be used in the project is low, but the implications of finding such resistance are potentially very high and may seriously affect the feasibility of the project. The earlier that samples from the Off Islands can be tested, the earlier these concerns can be dealt with.

3.2 Red squirrels on Tresco

Aim: To minimise risks of causing harm to Tresco's resident red squirrel population by use of rodenticide, live trapping, transportation and any other potential means, without affecting the chances of success of the rat eradication.

Red squirrels were introduced to Tresco in 2013 in the Abbey Gardens. They have established well and there are now an unknown number of animals on the island. Red squirrels are not typically attracted to wax block rodenticides of the kind likely to be used in the eradication, however, there is still a risk that they might consume it, either out of curiosity or if the poison is placed in areas where they forage for food. They are opportunistic feeders, mainly eat seeds, nuts, and fungi, but they could accidentally ingest rodenticides if these are accessible. As animals similar in size to brown rats, it would not be possible to physically exclude them from bait stations while continuing to allow access to rats. Tresco Estate carry out rat control on the island, but only put rodenticide out overnight in order to protect squirrels, an approach that could be adapted for use during the proposed rat eradication. The squirrels are the responsibility of Tresco Estate and the project can only advise on ways in which risks could be minimised. While there are risks from rodenticide, there are also welfare risks from live trapping, holding previously wild animals in captivity, translocating them and releasing them into new sites. The relative risks and benefits of the different options must be carefully considered.

The four main options under consideration are explored in more detail in table 4. Options include doing nothing and accepting that some squirrels may be affected by rodenticide, keeping the squirrels *in situ* but attempting to limit their access to rodenticide, live trapping some or all of the population and either holding them in captivity on Tresco with a view to future release or translocating them to a new site where they may either be held in captivity or released. If the squirrels are left in their usual habitats on the island then it may be possible to close rodenticide stations in the morning and re-open them in the evenings, allowing access to nocturnal rats but excluding diurnal squirrels. A small-scale study carried out as part of the 2017 feasibility study trialed a series of modified rodenticide stations to see whether a design could be found that was used by rats but not squirrels. No squirrel activity was found in any of the stations, which is a positive indication but should not be taken to mean that they will not go into stations at all. Indeed, during the winter months when the eradication takes place squirrels may be more likely to enter stations. An extract from the abstract of the report is given below:

To investigate whether red squirrels could be deterred from entering bait stations we trialled a series of seven different bait station types, based around features considered to be unappealing to squirrels (e.g. long entrance tunnels, underground entrance tunnels). The stations all contained a non-toxic version of the rodenticidal bait which would be used in any proposed rat eradication project, to see if squirrels would enter them and eat bait. Ink tracking plates, designed to preserve the footprints of animals walking over them, were also set outside the entrances of the stations to see if squirrels approached the stations but did not enter and consume bait. The stations were left in place for ten days but, while signs of brown rat and Scilly shrew activity were found and squirrels were observed to be active in the area, no sign of red squirrels was detected in the bait stations.

The legal position of leaving animals on the island during the operational phase of the project must also be carefully considered. Under the Wildlife and Countryside Act 1981 red squirrels are placed on Schedule 5, meaning that it is an offence to 'intentionally or recklessly' 'kill, injure or take' red squirrels. The implications of remaining red squirrels potentially taking rodenticide during the operational phase must also be considered.

The reported distribution of squirrels covers an area of c. 40ha, of which only c. 3ha is described as having a high population density (Figure 1). This would equate to approx. 200 bait stations, assuming a 40 x 50m grid. It may also be possible to deter them going into bait stations through the use of supplementary feeding, as long as this can be done without giving rats access to the supplementary feed. Figure 1 shows the reported distribution of squirrels on Tresco. Population density is highest in an area of c. 3ha in and around Tresco Abbey Gardens (the two sections marked in the deepest shades of blue). Local ornithologist and naturalist Will Wagstaff has provided the following information on the locations where squirrels are found: The highest concentration is seen visiting the feeding boxes at the entrance of the gardens. Evidence and sightings of squirrels have been found within the wooded area outside the gardens ranging up to Abbey Road, with evidence of chewed pinecones found on the woodland floor. There have been a small number of sightings of along Abbey Drive, though this is very rare, and they have also been seen as far as Rowesfield on the north side of the Great Pool.

However, their distribution may extend beyond the limits shown here, as Paul St Pierre of RSPB, a regular visitor to Tresco, reports seeing them as far north as Old Grimsby.

More robust data on the distribution and population density of squirrels are necessary to inform next steps. At current, there is no exact data on red squirrel population size on Tresco; 20 individuals were introduced in October 2013, which had reportedly increased to around 100 individuals in 2019 (<https://www.itv.com/news/westcountry/2019-02-19/why-red-squirrels-are-thriving-on-the-isles-of-scilly>).

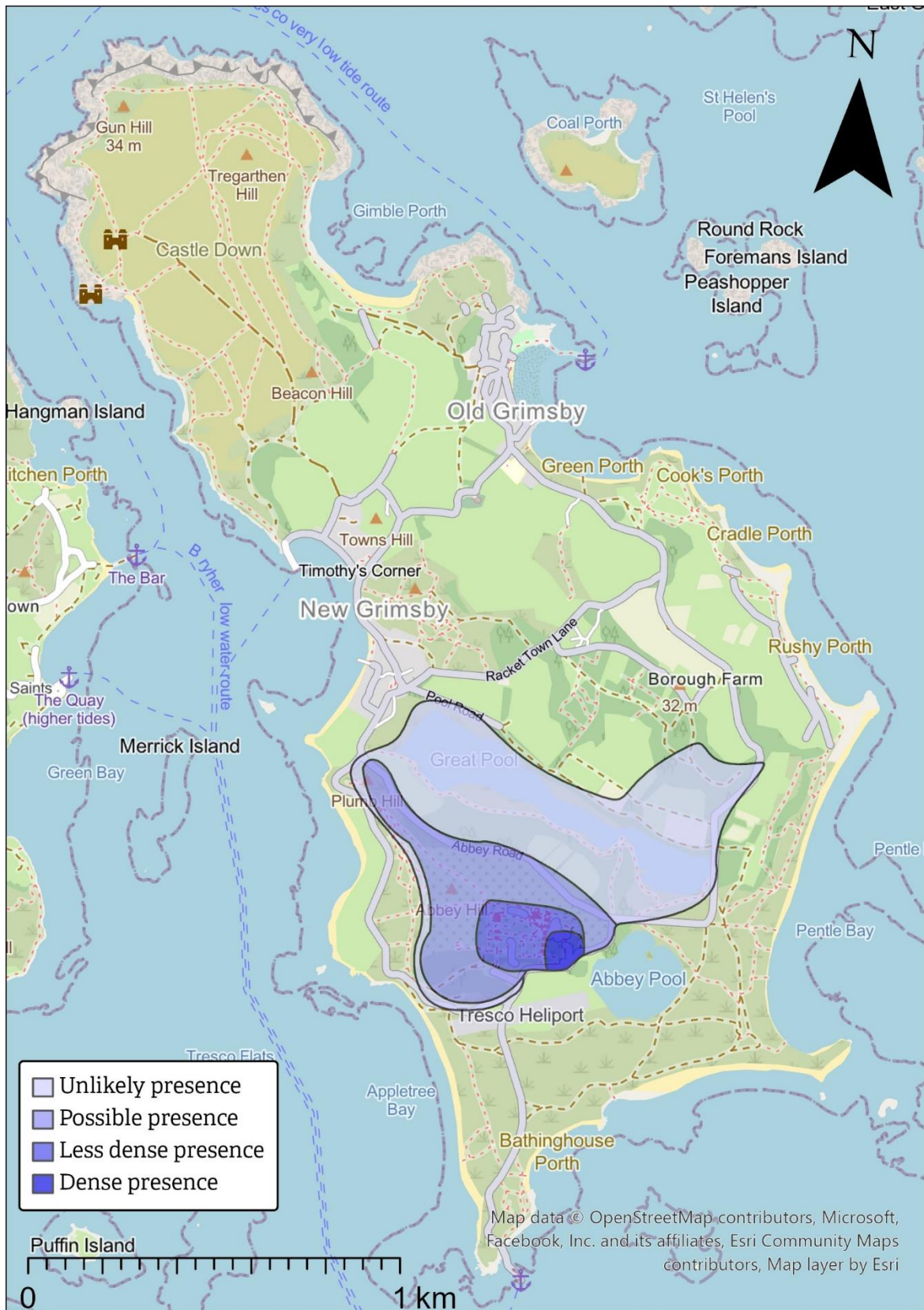


Figure 1: Location of squirrel population on Tresco. The highest population density of squirrels is found in and around Tresco Abbey Gardens. The total area covered by the squirrel population is c. 48ha, of which c. 9ha is the Great Pool and can be disregarded. The combined area of the ‘dense presence’ and ‘less dense presence’ areas is c. 3ha. Map kindly produced by Jacob Blackett, IoSWT

Table 4: Options for dealing with red squirrels on Tresco

Option	Pros	Cons	Conclusion
<p>1. Do nothing, leave squirrels in place during the eradication</p>	<ul style="list-style-type: none"> • No welfare implications around trapping squirrels or keeping them in captivity • No additional staff time or resources required • Squirrels remain on Tresco 	<ul style="list-style-type: none"> • Squirrels at risk of rodenticide poisoning – any stations accessible to rats will also be accessible to squirrels • Possible legal implications if measures are not put in place to reduce risks to squirrels 	<p>Not recommended as it places the entire squirrel population at risk</p>
<p>2. Leave squirrels on Tresco, attempt to limit squirrel access to rodenticide stations</p> <p>It would not be possible to design a station which differentiated rats and squirrels based on body size as they are so similar. However, it may be possible to have rodenticide stations only open at night in areas where squirrels were found. Squirrels are reportedly only found in c. 40ha of the island</p>	<ul style="list-style-type: none"> • No welfare implications around trapping squirrels or keeping them in captivity • Likely to require considerably less time and effort than live trapping squirrels 	<ul style="list-style-type: none"> • Measures to restrict squirrel access to bait stations may also restrict rat access, negatively impacting chances of project success • If the measures are found to be ineffective, social and/ or legal pressure to put in place further measures may add further risks to success of project • May require more staff time during rat eradication phase than if squirrels were not present (e.g. opening stations at dusk, closing at dawn) – this may put extra pressure on availability of accommodation • Strong contingency measures will need to be in place in case 	<p>RECOMMENDED</p> <p>This is considered the most suitable option at present, with the potential to pose minimal risk to squirrels while maintaining operational effectiveness against rats.</p> <p>Further research is needed to find bait station designs that can quickly, easily and reliably be switched between open and closed.</p> <p>The potential benefits of supplementary feeding should also be investigated.</p>

		<p>any squirrels are found poisoned</p> <ul style="list-style-type: none"> • Supplementary feeding of squirrels may inadvertently provide food for rats, compromising project success 	
<p>3. Live trap squirrel population, keep in captivity on Tresco or elsewhere on Scilly until Tresco is declared rat free (2 yrs after last sign of rats)</p>	<ul style="list-style-type: none"> • Trapped squirrels not at risk from rodenticide use • Squirrels not exposed to welfare risks of translocation • Captive squirrels (and/ or their young) can be reintroduced to Tresco with relative ease 	<ul style="list-style-type: none"> • Welfare implications of keeping squirrels in captivity for long periods • Red squirrel lifespan is c. 6yrs, so many animals will spend a sizeable proportion of their lives in captivity • It is likely that not all squirrels will be live trapped, leaving some at risk of poisoning • Keeping squirrels on island will require investment in suitable enclosures and staff time to keep squirrels clean and fed 	<p>Not recommended due to welfare implications for trapped squirrels, as well as concerns that only a proportion of the population would be trapped, leaving others vulnerable to rodenticide poisoning.</p>
<p>4. Live trap red squirrel population, transfer off Scilly for involvement in captive breeding or reintroduction programmes elsewhere in the UK.</p>	<ul style="list-style-type: none"> • Trapped squirrels not at risk from rodenticide use 	<ul style="list-style-type: none"> • Welfare implications of keeping squirrels in captivity, at least temporarily, and of transporting to mainland • It is likely that not all squirrels will be live trapped, leaving some at risk of rodenticide poisoning 	<p>Not recommended due to welfare implications for trapped and translocated squirrels, as well as concerns that only a proportion of the population would be trapped, leaving others vulnerable to rodenticide poisoning.</p>

As an immediate next step we propose commissioning squirrel expert Dr Craig Shuttleworth of the University of Bangor to produce a report on the following topics:

1. Design of a survey to assess squirrel distribution and population size. (RSPB/ IoSWT staff to carry out the fieldwork).
2. An expert opinion on the practicality, best methods, likely effectiveness and welfare implications of live trapping squirrels on Tresco, with the aim of removing all or nearly all of the population. If it is clearly not feasible, then provide an explanation of why it's not feasible/ desirable using current methods.
3. An expert opinion on whether the potential risk of the rat eradication project to squirrels can be effectively mitigated through the use of rodenticide stations only open overnight.
4. An expert opinion on the potential use of supplementary feeding to further reduce the risks of squirrels consuming rodenticide. Any supplementary feeding carried out would have to be inaccessible to rats.

Actions remaining

1. Set up a study looking at ways in which rodenticide stations could be modified to allow for rapid and reliable opening/ closing, and into the use of supplementary feeding. Use trail cameras to monitor squirrel and rat interactions with non-toxic 'rodenticide' blocks in stations and supplemental feeding stations.
2. Discuss options for the future of squirrels on the island with Tresco Estate.
3. Get clarity on legal position of using rodenticide while some or all of the resident squirrel population remain on Tresco.

Implications for feasibility

The presence of red squirrels requires careful consideration but is unlikely to present an existential threat to the progress of the proposed eradication project.

3.3 Grey seal disturbance mitigation plan

Aims: Minimise disturbance to grey seals while maintaining best practice for the operational phase of the project

Grey seals are an important nature conservation feature in Scilly, with an SAC being designated with this species as a feature. The usage of the Isles of Scilly by grey seals is complex. There is a regionally significant pupping population (in excess of 700 pups born here every autumn). In addition to the seals which mate and pup here, there are substantial numbers of other adult or sub-adult seals which visit Scilly, with individual recognition studies showing movements between Scilly and a range of other sites across the Celtic Sea.

The operational phase of the rat eradication will be carried out between September and March, with bait stations being set out in Sept-Oct and the use of poison likely to start at the beginning of November. The first part of this period is the peak pupping season in Scilly, with most pups being born here between August and November. There is thus a significant disturbance risk from the rat eradication, at the most sensitive time for the islands' seals. Actions so far include the drafting of an

initial seal disturbance mitigation plan by IoSWT as well as initial discussions with DEFRA and Natural England on the seal disturbance issue.

Actions remaining

1. Update to this section will be provided by the IoSWT by end of December 2025.
2. IoSWT and RSPB staff to identify all potentially affected islands and develop disturbance mitigation plan.
3. Produce a Habitats Regulations Assessment and seek agreement with NE on the mitigation measures.
4. Circulate plan to DEFRA and NE for approval

3.4 Management of rabbits

Aim: Understand and manage community concerns about a potential increase in rabbit grazing following the removal of rats.

Rabbit populations have, in some cases, increased following island rat eradication projects. Increased rabbit numbers will present a problem for some parts of the community due to their grazing behaviour. This issue has been raised by several community members and while a potential increase in rabbit numbers does not in itself pose a risk to the feasibility of the project, it does run the risk of reducing community support for the eradication. Concerns have also been raised in passing conversations about the increase of ticks in correlation to raise in rabbit numbers (though this is more likely linked to climate change). We therefore propose a three-step plan of action for dealing with the potential rabbit problem.

The first step is to engage with island businesses and residents who may be affected by an increase in rabbit numbers. Local businesses which may be affected by increased rabbit numbers are listed in Table 5. The proposed survey and control methods set out in steps 2 and 3 should be agreed in advance with this ‘rabbit stakeholder group’.

Table 5: Businesses which may be negatively impacted by increased rabbit numbers

Island	Business
Bryher	<ul style="list-style-type: none"> • Hillside Farm • Veronica Farm
Tresco	<ul style="list-style-type: none"> • Tresco Abbey Gardens
St Martins	<ul style="list-style-type: none"> • Scilly Organics Fruit & Veg • Churchtown Flower Farm • Polreath Tea Rooms (Growing own veg for café and guest house) • St Martin’s Vineyard

However, rats will not be the only driver of rabbit population density – disease, weather and vegetation availability (linked to rainfall and land management practices) will also have an impact. The second step therefore is to set up some simple baseline monitoring of rabbit abundance before the eradication starts, ideally as soon as possible. There are many methods available, the simplest of which is counting pellets in a fixed area plot and using this figure to calculate an estimate of the number of rabbits per hectare. This will provide a baseline against which post-eradication rabbit numbers can be compared but will also illustrate just how variable rabbit numbers are, which may help to show that post-eradication numbers are not out of the ordinary.

The third step is for the project to carry out rabbit control should rabbit numbers exceed an agreed threshold. Ideally this would be carried out by islanders, with equipment provided by the project, assuming this approach is acceptable to the island residents' rabbit stakeholder group. If rabbit numbers reach unusually damaging levels it may be necessary to bring in specialist contractors to carry out a knock down. Methods of rabbit control include shooting, use of ferrets and use of live traps such as multi-catch drop boxes which can be dug in along fence lines. We have sourced a highly experienced rabbit control contractor (Ed Cook of <https://www.evergreenrabbitcontrol.co.uk/>) to come to Scilly to visit the Off Islands, speak to locals, and advise on options for future rabbit control if/ when the need arises.

Actions remaining

1. Identify local stakeholders (community members and businesses) that may be affected by increased rabbit numbers. Gather views on what could/ should be done if rabbit numbers increase.
2. Set up rabbit baseline monitoring and carry out 2-4 times per year at the same times of year.
3. Develop costed plan for rabbit control, including what level of activity is required to trigger action.
4. Agree plan with local stakeholders

Implications for feasibility

The presence of rabbits will not make any difference to the operational phase of the rat eradication, but it could have an impact on community support. The project also has a responsibility to be aware of possible unintended consequences of the eradication and put plans in place to mitigate them. Any measures carried out on Bryher, Tresco and St Martin's should also be made available to St Agnes.

3.5 Cats

Aim: To minimise risks of secondary poisoning of cats, to reduce cat predation upon native species and to engage with the community on both points

There is a potential risk of secondary poisoning to cats which eat rodents (or other species which have themselves eaten rodenticide). This can be treated via a course of injections of Vitamin K1 if caught in time, but owners will need to be vigilant for signs and seek treatment quickly. Feral cats may be at higher risk of secondary poisoning since there is less chance of anyone noticing if they have eaten poisoned rats or are showing symptoms of poisoning. They are also more likely to be dependent on wild prey and since poisoned rats move slowly they are easier to catch. Cats, feral and otherwise, may also predate upon native birds and other species, meaning that the full potential conservation benefits of

rat eradication may not be realised. The project will need to engage effectively with island communities around the topics of potential secondary poisoning of pets and how this can be mitigated, and of trying to reduce cat impacts on native wildlife.

Community engagement should focus on developing a relationship with island cat owners, explaining the risks of secondary poisoning to cats and how these risks can be reduced. Cat owners should know the signs of rodenticide poisoning and have contact details of who they can call in case they are worried their cat (or any other domestic animal) may have been poisoned. The proposed rat eradication project also presents an excellent opportunity to engage with island residents on conservation-oriented cat ownership, including the use of collars with bells and keeping cats inside either full time or between dusk and dawn. Community engagement is also the first step in developing a plan for dealing with feral cats. From a conservation perspective these should be permanently removed from the islands but options should be discussed with relevant stakeholders, including local organisations with an interest in cat welfare. Due to their lack of human socialisation, truly feral adult cats are very difficult to successfully rehome, except possibly as farm cats where they may still impact upon native species. Feral kittens up to around 12 weeks old may be more successfully socialised. Trap-neuter-release is not generally recommended as it is highly stressful for an unsocialised feral cat and does not stop the animals preying upon native species for the rest of its life.

Actions remaining

1. Engage with island communities and other relevant stakeholders on the issue of cat ownership and a) potential risks of secondary poisoning and b) to gauge and try and reduce the impacts of cat predation upon native species.
2. Develop a 'Catalogue' with details of all owned cats on the island, including a photo. This can be used to help identify any cats thought to be at risk of secondary poisoning or, during the biosecurity phase, to identify animals which may be preying on native species.

Implications for feasibility

The presence of cats does not in itself affect the feasibility of the project, the risks lie in how the community responds to cat-related issues. Effective community engagement will be needed to manage these risks.

4. Operational Issues

4.1 Staff accommodation plan

Aim: Develop accommodation plan identifying options for accommodating essential staff on the islands

The ongoing housing emergency in the Isles of Scilly is a significant issue for the feasibility of the potential rat eradication project.

4.1.1 Accommodation needs

The ongoing housing emergency in the Isles of Scilly is a significant issue for the feasibility of the potential rat eradication project.

It is envisaged that the project will have accommodation needs for four categories of worker:

- Project preparation and delivery oversight staff – this may potentially represent eight staff, all assumed to be employed by IoSWT – likely to be employed for two years pre-eradication, for the eradication period itself (one winter, plus one to two contingency winters), thus 3.5-4.5 years in total; the staff are:
 - Project Manager
 - Project Administrator
 - Financial Administrator
 - Research Assistant
 - Communications Officer
 - Staff for each of the inhabited islands included in the project (3)

- Eradication workforce – this is assumed to be a contracted specialist company, with a workforce that may well number in the scores of individuals (one to three winter periods, each of six months; the contractor may require one or two staff members to be based in the isles for longer periods, but the need for this may be modest, and may be met with conventional tourist accommodation, and is not considered further)

- Post-eradication staff – this may represent six staff in the first two years post eradication, most or all of which are assumed to be employed by IoSWT (but there is potential for one or more roles to be done by contractors); the staff are:
 - Project Manager & Financial Administrator for 2 years (continued roles from project preparation & delivery period)
 - Biosecurity Manager and Biosecurity Officer (responsible for surveillance, volunteer management, community engagement, liaison with transport services and other boat users, maintenance of incursion response resource)
 - Conservation Detector Dog Handlers (two) & dogs (time allocation remains to be assessed – likely to be 1.5-2 FTE, with the dog handlers also assisting with other biosecurity and incursion response)

- Incursion response workers – required as and when incursions required – hoped to be short-term limited staffing required if incursions to be picked up quickly:
 - Post-eradication staff (as detailed above)
 - Other staff and volunteers resident in the islands
 - Volunteers (and seconded staff as available) from south west England

4.1.2 How accommodation needs could be met

Options for accommodation on St Mary's and the Off Islands are explored in Table 6 below.

- Project preparation and delivery oversight staff – **significant issue** – there are a range of ways in which this need can be met, but it represents a **large risk** to the delivery of the project. The solutions are likely to represent some or all of the following:
 - Appointment of staff already with secure housing in Scilly, with staff ideally being based on each of St Mary’s, St Martin’s, Tresco and Bryher;
 - IoSWT building staff and volunteer accommodation (major project with considerable uncertainty – unlikely to come to fruition before 2026/27 financial year at earliest);
 - Staff taking advantage of new local worker housing planned to come available in Scilly (various sites in pipeline);
 - Potential for partner organisations with ability to let housing prioritising SRP staff as key workers;
 - Some potential for SRP financial administrator role to be undertaken off Scilly (though this is undesirable);
 - Some potential for posts to be filled by a range of housing options – an unsatisfactory and thus very undesirable situation, which is likely to increase problems with staff retention, but such housing situations are all too familiar to many in Scilly.

- Eradication workforce – **moderate issue** – the workforce will be large, but will be required principally in the off-season, from autumn to early spring; it is likely that this need can be met with forward planning by the contractor, if they are given a long lead-in to the main eradication period (at least 12 months, preferably longer). The principal options represent a combination of the following:
 - Arrangements with tourism providers for block-booking of accommodation at winter rates in the November to mid March period;
 - Booking of tourism accommodation (e.g. self-catering cottages; hotel rooms) for periods when high-season prices may apply (September & October; Christmas & New Year period; late March onwards).

- Post-eradication staff – **significant issue** – situation and solutions likely to be very similar to that identified above for project preparation and delivery oversight staff.

- Incursion response workers – **can be met** – likely that sufficient provision can be enabled by short-term accommodation options such as visitor accommodation, camping in spring to autumn, whilst out of season in winter there may also be potential to make use of empty staff accommodation should local tourism businesses wish to offer in-kind support in this way; in addition, IoSWT hopes to build staff and volunteer accommodation.

Actions remaining:

1. Finalise project staffing needs.
2. Fully investigate accommodation options set out in Table 6.
3. Develop spreadsheet of accommodation options, including list of tourist accommodation providers who may be interested in housing the eradication team.

Implications for feasibility

Staff recruitment and retention on Scilly are already badly affected by the lack of accommodation on Scilly and the proposed project will add to that strain. Failure to recruit essential roles or loss of key staff members due to accommodation shortages could have a serious impact on the likelihood of the project succeeding. An accommodation plan should be produced at an early stage and kept updated.

Table 6: Accommodation options on Scilly for project staff

Accommodation type	Pros	Cons	Comments
Existing holiday lets	<ul style="list-style-type: none"> • Likely to be less busy in winter months • Income for island residents • Tresco and a the IoSWT trust had successful volunteer partnership where volunteers stayed at the traditional cottages in Tresco. Tresco have voiced their enthusiasm for hosting volunteers. 	<ul style="list-style-type: none"> • “Winter lets” get rented out to locals/staff during off season. • Expensive • Many places close in October-November/ January for maintenance. • Some places open over the Christmas period for tourists (mainly Tresco) 	<ul style="list-style-type: none"> • How many beds available on each island? • Bryher (85/110 single/double occupancy) • Holiday lets – 60 (based on double room occupancy) • Hell bay – 25 rooms • Tresco (37/50 single/double occupancy) • Flying boat cottages – 8-10 • Sea Garden Apartments – 4 • Sea garden cottages – 4-10 • Traditional cottages – 5-10 • The New Inn- 16 bedrooms • St Martins (71/143 single/double occupancy) • Shepherds’ huts – 8 (based on double room occupancy) • Self-catering chalets- 42 (based on double room occupancy) • Cottages – 63 (based on double room occupancy) • Karma – 30 rooms

Campsites	<ul style="list-style-type: none"> • Cheap • Unlikely to be booked up in winter months • Options for sturdier ready tents/ bell tents • Income for local businesses 	<ul style="list-style-type: none"> • Not suitable for coldest months • May be undesirable for volunteers and could affect volunteer sign up. 	<ul style="list-style-type: none"> • Bryher campsite: 38 pitches, 96 people (2 per pitch), 2 bell tents, 10 people (5 per tent)= 106 • St Martins campsite: 50 pitches, 100 people (2 per pitch)
Purpose built temporary structures (pods, flat pack cabins etc)	<ul style="list-style-type: none"> • Purpose built temporary accommodation has been successful installed and used at Parting Carn for the housing workers for infrastructure projects 	<ul style="list-style-type: none"> • Issues with permission from Planning Dept/ Duchy? • May not be desirable accommodation at coldest times of year • Will need electricity and water connection 	<ul style="list-style-type: none"> • Could these be put on campsites over the winter? • May not be desirable to campsite owners as will leave a lot of brown grass and mud sites for the subsequent season.
Existing buildings not currently used as tourist accommodation	<ul style="list-style-type: none"> • Income for island residents (some buildings may bring financial benefits beyond the end of the project) 	<ul style="list-style-type: none"> • May require considerable work to bring them up to suitable standard 	

4.2 Boating and weather

Aim: Determine a strategy for maximising the chances of staff being able to reach uninhabited islands during the eradication project.

The St Helens project has provided some useful lessons in managing eradications on uninhabited islands which will be used to inform planning for the proposed multi-island eradication project. The St Helen's project highlighted the need for Flexible logistical arrangements. Not being able to service bait stations regularly for periods of time due to weather conditions, as well as boating availability on a limited number of occasions, led to a build-up of mouldy bait, which may have contributed to bait avoidance by rats (see section: 4.3.2, Cholecalciferol and the St Helen's experience). We conclude from this that the proposed multi-island rat eradication project would need at least two dedicated boats, with appropriately qualified, experienced and insured skippers to ensure safety of staff while landing on uninhabited islands. Boats with certain adaptations for different landings should be considered. These arrangements would ensure that future larger projects could adapt to changing weather conditions and logistical challenges, reducing downtime and improving overall project efficiency.

Actions remaining:

1. Research suitable boats, costs of purchase, mooring, ongoing running and maintenance
2. Research into landing and accessibility restrictions for uninhabited islands.
3. Research options for boat staffing
4. Fully consider pros and cons of boat ownership vs. hire and decide on course of action.

Implications for feasibility

The project will involve logistically complex plans to visit many uninhabited islands, frequently and efficiently. Failure to visit all of these islands regularly will jeopardise the chances of a successful project.

4.3 Rodenticide choice

The choice of rodenticide is a key question for any rat eradication project. Historically, all rat eradications carried out in the UK have used anticoagulant rodenticides. These have a slow action, meaning that rats do not experience any ill effects until long after they have eaten a lethal dose, thus enabling entire populations to be targeted. Fast acting poisons, while effective at reducing rat populations, are unlikely to remove all rats as some will consume small doses, suffer sub-lethal ill-effects and develop an aversion. There are two main classes of anticoagulants – so-called 'first generation' anticoagulant rodenticides (FGARs), such as warfarin and diphacinone, which require multiple feeds and do not bioaccumulate and 'second generation' anticoagulant rodenticides (SGARs) such as brodifacoum and bromadiolone, some of which can kill in a single feed and bioaccumulate in animal tissues. All UK rat eradications with the exception of the Hebridean island of Canna have used SGARs, and they have also been used in the vast majority of island rat eradication projects worldwide.

However, anticoagulants are highly toxic to many other vertebrates which has led to attempts by regulators and the rodenticide industry to restrict their use and thus reduce risks to non-target species. Consequently, SGARs will no longer be licensed for use in 'open areas' past the end of 2024, without a situation-specific 'Critical Situation' Permit. Based on our experiences so far, applying for

Critical Situation Permits is likely to be a time consuming and exacting process and project planners will need to ensure that enough time and human resource is allocated to that task. As it stands, we have had assurances from the industry body The Campaign for Responsible Rodenticide Use (CRRU) and the Health and Safety Executive (HSE) that they did not intend to prevent the use of SGARs in island rat eradication projects, but until we have a clear and straightforward path to obtaining the necessary permissions this will remain a risk. We are keeping a close eye on the progress of the LIFE Raft project working to eradicate rats from the island of Rathlin in Northern Ireland, who are currently working through the Critical Situation Permit process.

While it appears that the use of SGARs will be possible for the eradication phase of the project, there is further uncertainty over whether these products could be used to meet any future biosecurity needs – i.e. responding to known or suspected rat incursions. Best practice for responding to rat incursions is to set out a grid of rodenticide stations for 500m in all directions from the rat sign or sighting – effectively a smaller version of the ground-based eradication process. This action would therefore also need permission for the rodenticide involved to have clearance for use in open areas. Again, our hope is that a process for gaining the necessary permission will be in place in the near future, well in time for the proposed restoration project on Scilly, but we will continue to monitor the situation and to make plans for alternative products and methods if necessary.

Island restoration best practice is a collection of tried and tested methods which have been proven over time to give the best chances of successful eradication of the target species. Eradication projects are generally very costly and involve killing large numbers of animals – following proven methods known to maximise chances of success therefore will save money and result in fewer animals being killed overall. For this reason, innovations in best practice are generally on relatively small scale – the basic model of a grid of stations, almost always containing a SGAR product, has been in place since the 1980s. The wholesale shift to an alternative main rodenticide would therefore not be recommended for the proposed work on Scilly, though it is possible that alternative active ingredients may have a role to play in. We are of course mindful of the extremely toxic nature of SGARs and the high risks they pose to non-target species, both those which may consume the bait directly (primary poisoning) or those which may eat animals which have themselves consumed the bait (secondary poisoning). We are therefore open to considering potential alternatives to SGARs, as outlined below

4.3.1 First generation anticoagulant rodenticides

The obvious alternative would be to use a FGAR product as, of the alternatives available, their mode of action is the most similar to SGARs and is therefore likely to slot most readily into the best practice methodology built around SGAR use. FGARs are not covered by the changes in use due to come in from the beginning of 2025 as they pose a much lower risk of causing secondary poisoning. The FGAR diphacinone was successfully used at the main rodenticide during the eradication of brown rats from the Isle of Canna in the Hebrides in a project carried out over the winter of 2005-6. This was due to concerns about the risk of secondary poisoning in the population of white-tailed eagles. A small quantity of a SGAR product was used to target a few individuals which did not take sufficient diphacinone, but the vast majority of rats were killed using the FGAR product.

However, diphacinone is no longer registered for use in the UK and there are currently no FGAR products registered for use against rats outdoors in open areas listed on the HSE biocides database.

We will continue to monitor the database and industry literature to learn about any new FGAR wax block products coming to the UK market.

4.3.2 Cholecalciferol and the St Helen's experience

As it stands the only rodenticide registered for use outdoors in open areas from January 2025 is Harmonix Rodent Paste, manufactured by ENVU and containing the active ingredient cholecalciferol, also known as vitamin D3. This is not an anticoagulant and has a totally different mode of action, causing death through hypercalcemia. When rats ingest a lethal dose, the high levels of calcium disrupt various bodily functions, particularly affecting the kidneys, blood vessels, and other organs by calcifying soft tissues. This leads to organ failure and death, usually within a few days. It poses a lower risk of secondary poisoning as it does not accumulate in tissues and there is no known resistance to it. It has a so-called stop-feed effect whereby animals stop eating it once they have eaten a lethal dose, which further reduces risks of secondary poisoning. Consumption of a lethal dose leads to death within 3-4 days, a slightly shorter time frame than for anticoagulants. Cholecalciferol had been used in two island rat eradication projects prior to St Helens, one in New Zealand and one in Mexico, both in the early 2000s. Both were reportedly successful but given the very high success rates of anticoagulants the demand for alternatives appears to have been low.

The lack of successful eradication on St Helen's was likely due to a combination of factors, including relatively long periods where the island could not be visited (principally due to weather, although boat availability was a limiting factor on occasion) meaning stations could not be checked and replenished, contrary to best practice. There was evidence that rats started to avoid bait stations containing Harmonix, presumably after either taking a sublethal dose, or not taking any at all due to decomposition/ mould. We consider that the failure of Harmonix to eradicate the whole population on St Helens was due to a combination of the following factors: 1. Use of a relatively fast acting rodenticide leading to bait avoidance and some rats failing to consume a lethal dose 2. The formulation of Harmonix (soft paste in a paper sachet, reminiscent of a blob of playdoh in a teabag) did not stand up well to the weather conditions encountered, and it quickly crumbled and/ or went mouldy, leading to further avoidance by rats and 3. Weather conditions leading to relatively long periods where stations could not be checked, compounding issues of bait palatability.

Actions remaining

1. Continue to monitor use of Critical Situation Permits on other projects.
2. Liaise with HSE on the development of the Critical Situation Permit application process – how long will it take, what background information is required, what is the pathway by which permits are obtained.
3. Continue to monitor HSE database for newly registered FGAR products.
4. Consider further trials of alternative rodenticides on project islands.

Implications for feasibility

Eradicating rats from islands is an expensive process, involving risks to many species, including humans, and the widespread death of rats. For these, and many other, reasons it is essential to follow best practice guidance, hard-won from more than 50 years of eradication projects, to give a project the maximum chance of success and avoid needless harm to animals as well as wasting valuable

conservation funding. Consequently, it is a very conservative field, sticking closely to tried and tested best practice and keen to avoid major innovations which may increase the chance of failure. Given our current knowledge of how rodenticides perform in island eradication projects, as things stand, we would recommend the use of a wax block SGAR formulation as the primary bait and project staff should therefore be prepared to go down the Critical Situation Permit application route. We will in the meantime continue to monitor developments in rodenticide technology and application, and are open to the possibility of using alternative products on a small scale within the wider eradication project.

5. Financial

Aim: Determine accurate budget for eradication and biosecurity costs

The 2017 Feasibility Study included a draft budget of c. £1.8 million, for the basic elements of the eradication and a check after two years to determine whether it had been successful (as is standard practice). It does not include any of the ongoing biosecurity actions, the need for the project to have at least one boat (and crew) of its own and does not take into account the high levels of inflation which have occurred since 2017. It also only allocates 12 trips to each uninhabited island, while the experience on St Helens suggests that more trips are likely to be necessary. Costs of waste management, such as paying to remove bulky waste from islands in the preparation phase, transport on islands, and costs of buying, running and maintaining biodigesters were also not included. Crucially, it does not include staff costs for the project preparation and delivery oversight, and ongoing biosecurity phases, which will be a major part of the overall cost. The final budget is likely to be considerably higher, likely several times the 2017 estimate.

An essential first step in finalising the budget is finalising the staffing requirements – this is likely to be the major cost outside of the actual eradication contract. The roles and responsibilities which will need to be covered are shown in Tables 7 and 8 below. Table 7 includes staff who would be employed as part of the project development and operational support actions. Table 8 shows the duration and timing of roles for the project preparation and delivery oversight, and ongoing biosecurity phases.

Table 7: Staff required for the project preparation and delivery oversight phases of the project. Note that not all of these roles will need to be full time (though it is likely that most will be), and not all need to be based on Scilly.

Role	Responsibilities
Project Manager	Overall responsibility for execution and success of project
Project Administrator	Overall responsibility for collating and managing information for reporting and claiming for funders and partners.
Financial Administrator	Management of budget and expenditure
Research Assistant	Leading the pre- and post-eradication ecological monitoring work, analysing and writing up results.
Communications Officer	Leading on communications, within partnership and with public.
Bryher Island Officer	Leading on community engagement and project preparation actions on each of the Off Islands included in the project
Tresco Island Officer	
St Martin's Island Officer	

Actions remaining:

1. Fully review 2017 budget and update costs, equipment and staff requirements

Implications for feasibility

Insufficient funding is one of the most serious risks for an eradication project – if the money runs out before the work is completed the target species will bounce back quickly and there will only be a short-term conservation gain. Detailed planning will be required to ensure all necessary costs are included in the final budget. Contingency costs will also need to be included in case the work needs to be extended over additional years.

Table 8: Likely duration and timing of project preparation and delivery oversight and ongoing biosecurity roles. Note that the successful contractor will be responsible for employing people for the actual eradication, those roles are not shown here.

	Oct 2025 - Mar 2026	Apr 2026 - Sept 2026	Oct 2026 - Mar 2027	Apr 2027 - Sept 2027	Oct 2027 - Mar 2028	Apr 2028 - Sept 2028	Oct 2028 - Mar 2029	Apr 2029 - Sept 2029	Oct 2029 - Mar 2030	Apr 2030 onwards
Action:	Preparation	Preparation	Preparation	Preparation	Eradication yr1	Preparation	Eradication yr2*	Preparation	Eradication yr 3*	
						Biosecurity	Biosecurity	Biosecurity	Biosecurity	Ongoing biosecurity
Project Manager										
Project Administrator										
Financial Administrator										
Communications Officer										
Research Assistant										
Bryher Island Officer										
Tresco Island Officer										
St Martin's Island Officer										
Biosecurity Manager										
Biosecurity Officer										
Detection Dog Handler 1										
Detection Dog Handler 2										

*Note that it is possible that the eradication will be completed in the first or second year, in which case eradication efforts will not be needed in years 2 or 3. In this case the top eight roles in the table may finish earlier than March 2030.

6. Conclusions and Recommendations

As with the 2011 and 2017 feasibility studies, there is nothing uncovered by this report which would make the proposed eradication unfeasible. It remains however, an extremely complex undertaking with many areas of risk, as highlighted in this report. Community support – or at least acceptance - is crucial and should be at the heart of the development of the operational phase of the project and will feed into the successful resolution of other issues such as waste management and accommodation. The project will involve extensive work on designated sites including Historic Monuments, SPAs and SSSIs, which will require permits. Permissions will also be needed for any work that may affect protected species such as grey seals and red squirrels. The priorities for the project at this stage are to resolve the remaining actions highlighted here, which will require ongoing commitment of staff time from IoSWT and RSPB.

7. Acknowledgements

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8. References

Bell, E.A. (2011) *Isles of Scilly Seabird Recovery Project: Part 2: Assessing the feasibility of removing rats from the Isles of Scilly archipelago*. Unpublished technical report prepared for the Isles of Scilly Seabird Recovery Project Partnership

Pearson, J., Odgers, H., Lloyd, M., Blackett, J., Swiercz, P., O'Leary, A. 2024. St Helen's and Round Island rat clearance 2023-24: Technical report. Isles of Scilly Wildlife Trust

Thomas, S., Varnham, K & Havery, S. 2017: Current Recommended procedures for UK (bait station) rodent eradication projects. (Version 4.0) Royal Society for the protection of Birds, Sandy, Bedfordshire.

Varnham, K.J. & St Pierre, P. (2017) Feasibility Study for the eradication of brown rats (*Rattus norvegicus*) from Bryher, Tresco, St Martin's and associated uninhabited islands, Isles of Scilly. Report to RSPB, Isles of Scilly Wildlife Trust, Isles of Scilly Council, Duchy of Cornwall, Tresco Estate, Natural England and University of Exeter ESI (Falmouth)

Appendix 1: Community Engagement analysis

Initial information gathering (via Island Officer, Megan Lloyd) was conducted in June-August 2023. Feedback of the project thus far was gathered through face-to-face conversations through visits to each household and business. On Bryher, 43 households and businesses were visited and on St Martins 80 were visited. Questionnaires were also given to each household, of which only 14 were completed and returned. A summary of the responses of households and businesses to these conversations and questionnaires is show in Table A1.

The initial conversations and questionnaires with the community raised concerns about the effects of the rat eradication on rabbit population numbers, the funding and the logistics of the project.

Table A1: Summary of household and business responses to the proposed project on Bryher and St Martins

Bryher	Number of Households	Households spoken to	Positive Interactions	Negative Interactions	Neutral Interactions
Equipped holdings	2	2	2	0	0
Bare land holdings	1	1	1	0	0
Commercial	8	8	6	0	2
Other households	32	13	9	1	3
Total	43	24	18	1	5
St Martins	Number of Households	Households spoken to	Positive Interactions	Negative Interactions	Neutral Interactions
Equipped holdings	4	4	3	1	0
Bare land holdings	17	3	3	0	0
Commercial	9	9	5	1	3
Other households	50	6	5	0	1
Total	80	22	16	2	4

Appendix 2: Community Co-Design Waste Management Workshops

In collaboration with the Isles of Scilly Wildlife Trust Seabird Recovery Project, University of York, and Isles of Scilly Community Venture CIC, a series of workshops were held across the islands from September 9th to 13th. The aim was to lay the groundwork for a composting pilot scheme that will benefit the Isles of Scilly. Two events per day were held on the off-islands of St Agnes, Bryher and St Martins, one between 12 and 2pm and the second from 5-8pm. A Lunchtime and evening event were also held on St Mary's.

The workshops consisted of three tasks, the first of which was to identify and discuss current waste management being conducted on island and highlight its strengths and flaws. The second task was to brainstorm and discuss a recent new technology brought to the islands, analysing its successes and flaws. This helped identify requirements for any future waste management technologies. The final task was to brainstorm what a “new” waste management would look like for each island, identifying anything it “must do” and “must not do”.

St Mary’s – 14 residents and business owners engaged at events – 1:1 meeting with Craig Fraser at Tregarthen’s Hotel.

St Agnes – 10 residents and business owners engaged at events – 1:1 meeting with Aiden Hicks at Westward farm.

Bryher – 4 residents engaged and business owners at events – 1:1 meeting at Fraggie Rock.

St Martins – 12 residents and business owners engaged at events – 1:1 meeting with Jack Gilet and Jason Poat – Polreath Tea rooms.

At total of 44 residents and business owners were engaged through the week of events.