Involving the community in rodent eradication on Tristan da Cunha

K. Varnham[1], T. Glass[2], and C. Stringer[3]

[1] University of Bristol, School of Biological Sciences, Woodland Rd, Bristol, BS8 1UG, UK. <karen.varnham@bristol.ac.uk>. [2] Government of Tristan da Cunha. [3]The Royal Society for the Protection of Birds, Potton Rd, Sandy, UK.

Abstract Tristan da Cunha is the world's remotest inhabited island, with a population of around 270 people. Ship rats (*Rattus rattus*) and house mice (*Mus musculus*) are present on the main island of Tristan and house mice are present on Gough Island, also part of the UK Overseas Territory of Tristan da Cunha. The impacts of invasive rodents on both islands have been well documented and detailed plans to eradicate them were developed in association with island representatives. In March 2008, the island was visited to discuss eradication plans with the island community and get their views on the proposals. Information disseminated about the project was followed by individual meetings with all government departments and other employers. These individual meetings proved by far the most effective forum for hearing people's views. Strong concerns were expressed about the safety of an aerial bait drop on Tristan, in particular the perceived risks to children, livestock and the security of the water supply. The proposed eradication of mice from Gough Island was fully supported. Although the population on Tristan did not want a full-scale rodent eradication carried out on the island, they were keen to have improved rodent control around the settlement and at agricultural sites. This work underlines the importance of detailed public consultation with small island communities during the planning of rodent eradication projects. The proposed Tristan rodent eradication project would not have been successfully completed without the full support of the Tristan community. Plans for rodent eradication on Tristan have been shelved for the time being.

Keywords: Aerial bait drop, inhabited island, house mouse, *Mus musculus*, operational plan, poison, ship rat, *Rattus rattus*

INTRODUCTION

The Tristan group is home to many endemic species, including plants, invertebrates and birds. The Tristan albatross (*Diomedea dabbenena*), now restricted to Gough Island, is one of four species of endemic birds and 27 of the islands' 50 species of native flowering plants are also endemic (Ryan 2007). Rats were introduced to Tristan in 1882 following a shipwreck and became widespread across the island within two years, while mice probably arrived sometime in the 18th century on Tristan and the 19th century on Gough (Angel and Cooper 2006 and refs therein). On Gough Island, mice prey upon chicks of the endangered Tristan albatross, Atlantic petrel (*Pterodroma inverta*) and great shearwater (*Puffinus gravis*) (Wanless *et al.* 2007), and probably also upon the chicks and eggs of the endemic Gough bunting (*Rowettia goughensi*) as well as endemic flightless moths (Angel and Cooper 2006). On Tristan the impact of rats and mice has, in general, been poorly studied. However, together with feral cats (*Felis catus*), which are now believed to be eradicated from Tristan, introduced rodents, livestock and humans are believed to be largely responsible for the historic declines in seabirds on the island (Angel and Cooper 2006). Rodents are also a pest for the human population of the island, eating potatoes as well as other crops and foodstuffs and presenting a public health risk. The continued presence of invasive rodents on Tristan also increases the risk of their reaching the nearby rat-free islands of Nightingale and Inaccessible, where they would be likely to cause further ecological devastation. If associated with conservation measures that limit human impacts on birds and the environment, the eradication of invasive rodents could thus greatly improve the security of many native species.

As the effects of introduced rodents became more obvious, Tristan's Agriculture and Natural Resources Department (ANRD) asked the Royal Society for the Protection of Birds (RSPB) to propose to the Overseas Territories Environment Programme (OTEP) a feasibility study for eradicating rats and mice from Tristan and mice from Gough.

Here we describe the results of consultation with the islanders to gauge the range of their views over rodent control and eradication options for the Tristan group. We found that the islanders supported rodent eradication, but only if there was no risk of humans or livestock coming into contact with the baits spread by helicopter. There was thus strong support for eradicating mice from Gough, but little enthusiasm for attempting rodent eradication from Tristan.

METHODS

Study site

The UK Overseas Territory of Tristan da Cunha is in the South Atlantic Ocean, approximately halfway between the tip of South America and Africa (Fig. 1). The territory consists of four islands: Tristan da Cunha (Tristan), Inaccessible and Nightingale, all within around 30km of each other, and Gough, some 350km to the south-east. The two inhabited islands, Tristan and Gough, are accessible only by ship. Tristan has been settled since the early 19th century and currently has a population of some 270, while Gough is the site of a South African meteorological station with a staff of six. The inhabitants of Tristan live on a 5 km

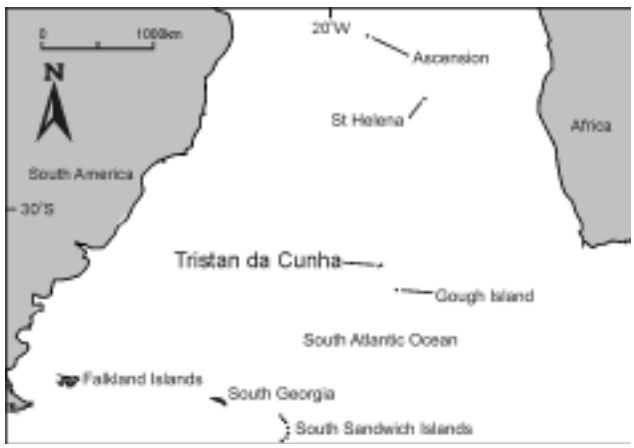

Fig.1 The location of Tristan da Cunha and Gough Islands.

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long coastal plain on the north-west of the island, where they farm cattle and sheep and grow potatoes. Additional food and other supplies are shipped to the island from Cape Town, South Africa. The islanders' main income is from the sale of fishing rights for crayfish and tourism. The island is governed by an administrator appointed by the UK government in association with an elected Island Council.

Proposed rodent eradication plans

Rodent eradication planning began in 2004 and included a stakeholder workshop in 2005 and the production of detailed operational plans for two rodent eradication projects: the eradication of ship rats and house mice on Tristan (Brown 2007; 2008) and house mice on Gough (Parkes 2007). The proposed eradication projects would be very expensive (estimated costs for the Tristan project were in excess of £2m). Funding for the eradications was to be sought only once the community had decided on their preferred options. Both plans aimed to use helicopters to spread cereal-based pellets containing the second-generation anticoagulant rodenticide brodifacoum (see Brown 2007; 2008; Parkes 2007).

Community involvement

The community on Tristan was involved at every stage of the proposed rodent eradications. The Chief Islander and another representative of the community participated in a workshop in South Africa in the early stages of the project (Anon. 2005). In addition, detailed input from every household on the island was sought by a questionnaire in 2007 (Glass *et al.* 2007) and in 2008 a consultant (KV) discussed the operational plans with the community. The discussions aimed to determine how the project could be made acceptable to the Tristan community, while avoiding any risk of failure. The discussions were approached in two ways: 1) ensuring that islanders were informed about details of the operational plans, particularly how the plans would affect people's daily lives; and 2) gathering feedback from the informed community about whether and how islanders would like to proceed with the eradication plans. There was no attempt to influence the community's decision. Rather, we wanted to make sure that people had all of the information needed to make an informed choice about the planned eradication projects. The first phase informed people of the content of the operational plans and how these projects might affect their everyday lives as well as the island as a whole. Focussing on concerns raised during the questionnaire (Glass *et al.* 2007), summaries of the projects were produced along with a list of answers to frequently asked questions, and both documents were distributed to every household. An interview about the eradication plans was also broadcast on Tristan local radio. The second phase gathered the views of island residents on the eradication plans. A public meeting, open to all residents, discussed the eradication plans and enabled islanders to comment. At this meeting, options that might make the eradication plan on Tristan more acceptable to the community were presented, based on comments from islanders and eradication planners. At the suggestion of some islanders, a series of smaller meetings were subsequently held at various workplaces on Tristan (eleven government departments and the fish factory). These meetings were collectively attended by 58 people. We did not seek to quantify the numbers of people holding particular opinions, simply to gauge the range of views of the community to the various options for rodent control and eradication.

RESULTS AND DISCUSSION

Community involvement

Awareness of the issues raised by the eradication plans varied considerably between individuals. In general, only those people connected to the ANRD had a good understanding of the aims, methods and likely ecological impacts of the eradication projects. Understandably, people tended to consider the project mainly in terms of its possible impacts on themselves, their families and their livestock. Few comments were made about the possible effects on Tristan's native wildlife.

The public meeting included proposals suggested by islanders and eradication planners such as providing water tanks for households to store water, compensation guidelines for any livestock lost due to project activities and what to do with feral stock on parts of the island. Although this public meeting was a useful way for getting large amounts of information over to the population in a short space of time, it was poorly attended and did not generate much useful feedback. However, some people were encouraged to speak to members of the Island Council or to their heads of department, which allowed their views to be passed on to some extent.

Compared with the public meeting, the smaller meetings with government departments and other employers generated much more discussion and feedback. While these meetings did not involve everyone on the island, they allowed the majority of people of working age a channel to express their views. People also had the opportunity of approaching members of the Island Council and communicating their opinions to them.

The departmental meetings revealed for the first time that many islanders had significant reservations about going ahead with plans to eradicate rodents from Tristan. Greatest concern was over the safe use of poison and this ultimately led the Island Council to decide not to take the Tristan eradication plans any further. All parties involved in the proposed rodent eradication on Tristan agreed that it could not go ahead without the support of the entire Tristan population. At the time of KV's visit, it became clear that this level of support did not exist. However, support for the eradication of mice from Gough Island was near-unanimous. Below, the main areas of concern raised by the islanders are summarised.

Questionnaire design

The household questionnaires conducted in June 2007 (Glass *et al.* 2007) showed 100% agreement in response to the question 'do you think it would be a good idea to get rid of rats and mice on Tristan', although one-third of households raised some concerns. However, during the departmental meetings in 2008 a sizeable minority of islanders stated that they were opposed to the idea of a rodent eradication project on Tristan, with several commenting that they had never thought it was a good idea. Why then had this apparently unanimous support disappeared in less than a year? We believe that while people liked the idea of Tristan being free of rodents, they did not agree with the method proposed. The questionnaire usefully identified concerns about the proposed plan, such as safety of the water supply and the risks to pets and livestock. However, the questionnaire did not specifically seek views about the way baits would be spread. Presumably everyone was told that the poison would be dropped by helicopter but only one person apparently raised any concern about 'aerial

spraying' in the settlement. A direct question about whether islanders were happy with the idea of an aerial bait drop might have revealed those concerns that later emerged.

Finally, we are unsure whether peoples' perceptions were affected by their views of those conducting the questionnaire. If the community assumed ANRD staff to be in favour of rodent eradication, people may have responded more positively to their questions. In addition, the questioners' own views may have influenced the way they recorded people's responses. Such potential biases may be overcome by using professional input for designing the questions and demonstrably impartial people to carry them out. Islanders might be more comfortable speaking to people from their own community than outsiders, so staff from other local organisations could be employed to carry out such questionnaires.

Issues related to the safe use of poison

Concerns about the use of poison on the island fell into three categories: risks to island residents and livestock, methods of distribution, and persistence in the ecosystem after the eradication.

Immediate risks to residents and livestock

Many were interested to learn more about brodifacoum, its properties and its track record in eradication projects. Misunderstandings about the properties of brodifacoum were addressed, such as the widespread belief that it would poison the water supply. Evidence was presented about brodifacoum's insolubility in water and how it had never been found in samples of water taken after eradication projects (e.g., Primus *et al.* 2005). However, some fears remained including disapproval of all kinds of poison due to perceived serious, long-term and unpredictable consequences and the lack of a guarantee that previously unrecorded effects would not appear on Tristan. Some of these fears were allayed when it was pointed out that similar chemicals had been in use on Tristan for many years for pest control around the settlement with no recorded ill effects on the human population.

Another concern was that brodifacoum levels in meat and water samples could not be tested on the island. Since this process relies on the use of specialist techniques (high performance liquid chromatography, HPLC) it needs to be carried out in an accredited laboratory with the appropriate equipment. Several people raised the point that Tristan's shipping schedule meant that samples could only be tested around every 2-3 months and that there would then be at least a 7-10 day delay in obtaining results. Although unlikely, should water be contaminated, nothing could be done other than to evacuate the whole population.

Helping a community to interpret the risks of a complex project such as an island-wide rodent eradication is an extremely important but demanding task. Specialist toxicologists might have helped but a core of islanders, perhaps a majority, was wary of taking any kind of risk over the eradication. Several people commented that they wanted 100% guarantees that the project would be safe. Arguments based on the science of previous similar projects were, therefore, sometimes seen as too equivocal. Given this situation, specialists in toxicology or risk interpretation would probably not have been significantly more successful since no one could guarantee that a project would be entirely safe.

Method of distributing poison

There was also widespread concern about aerially spreading poison in the settlement, over potato patches and on pasture areas (all located on the Settlement Plain). Bait stations were perceived as a much safer option. Several islanders were of the view that, although they understood it was impractical, they would be more likely to support the project if bait stations could be used across the entire island. Islanders were also concerned that aerial bait drops had not previously been carried out on an island with such a large human population. Examples of anticoagulant bait dropped aerially on inhabited islands (Merton *et al.* 2002) in the Seychelles were considered irrelevant by most of the Tristan residents, due to the small size of their communities.

Persistence of poison in the environment

Despite information about the use of anti-coagulant poisons for around 50 years without recorded long-term health impacts, many people were unconvinced. Concerns were over persistence in the environment and long-term health consequences for humans or livestock.

Livestock

The second biggest concern was how to manage the livestock before, during and after the proposed eradication. Overall, the plans for dealing with stock on Settlement Plain (the main location of livestock on the island) appeared to be largely acceptable (i.e. building two secure areas at opposite ends of the plain and moving stock between them to avoid bait being dropped on them). Plans for reducing the numbers of feral animals (sheep on the Base and cattle at Stony Beach and the Caves) made some progress but there was no final agreement on the extent of reduction. Most people agreed with the idea of reducing stock numbers temporarily during the poisoning phase, on the condition that good-quality replacement animals would be provided.

Evacuating people from the island

Families with small children, and those with medical conditions that may leave them at higher risk from contact with anticoagulant poison, were offered the opportunity to leave Tristan for the duration of the project. They were offered places on the ship supplying the project at the start of the project and a stay in South Africa until the poisoning phase was completed. This idea seemed to be well received but several people asked how much space there would be on the project ship and what would happen if more people who met the criteria wanted to go than could be accommodated on it.

Economic threats

During the feedback-gathering phase an announcement was made by the Administrator concerning the island's economic future. Briefly, the Administrator concluded that the island was facing an uncertain economic future, with total income likely to decrease over the next few years. This statement focused people's minds on how they might have to cope with lower incomes in the future and thus become more reliant on home produced food. This made people even more sensitive to any possibility that the proposed eradication might threaten the security of traditional food sources such as island beef, mutton, fish and potatoes. If the Tristan rodent eradication project was to proceed, people would need to be assured that the plans would not threaten their economic wellbeing.

CONCLUSIONS

The proposal to eradicate rodents from Tristan was not generally perceived by the residents to have significant conservation benefits and the potential for seabird recovery

on Tristan was not widely appreciated. Gough Island was seen as being much more important for wildlife, due to the presence of Tristan albatrosses and other species not present on Tristan. Although sympathetic towards Tristan's wildlife, people were more concerned about the wellbeing of their own families and livelihoods. People repeatedly mentioned that what they wanted was better pest control around the settlement and the potato patches and that this could be achieved without the risks they believed were associated with an island-wide rodent eradication project.

Such projects might be more acceptable to island communities if perceived risks could be reduced and benefits to the community increased. Perceived risks could be reduced by using bait stations around inhabited areas and by bringing livestock under cover for the duration of the project. Negotiation with islanders and education are also essential for reducing perceived risks and should be an integral part of any eradication project planned for an inhabited island. This step should include a scientific explanation of the likely ecological benefits of eradications and should focus on the ecological value of the island and its wildlife. Information about proposed eradication methods and their potential risks to humans, livestock and wildlife should also be freely available. Rodent eradication projects are essentially a package of useful people, skills and equipment, components of which could be used for the benefit of islanders. As long as there is no conflict with the needs of the eradication project, people and equipment could occasionally assist the community, something that could be built in from the planning stages. This may include providing some helicopter time for community needs in the case of projects with aerial bait drops, or shipping cargo for the community over with project equipment.

Following the many successful eradication projects of recent years, the supply of uninhabited suitable islands for rodent eradication has diminished, and increasing numbers of inhabited islands are now being considered for such projects. Dealing with communities on these islands is therefore likely to become an increasingly significant task. Every eradication project and every island community will be different, but there are common issues affecting them all. There are striking similarities between the concerns shown by the residents of different islands during the exploratory stages of rodent eradication projects (see Ogden and Gilbert 2011; Wilkinson and Priddel 2011), particularly in relation to aerial spread of poison. The methods for carrying out successful rodent eradication projects on uninhabited islands are now well defined and widely used. However, it seems that these methods will need to be modified to include avoiding poison drops over populated areas and education campaigns if they are to be successfully applied to inhabited islands.

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