

Plans to eradicate invasive mammals on an island inhabited by humans and domestic animals (Corvo, Azores, Portugal)

Oppel, S.¹, Beaven, B.M.², Bolton, M.¹, Bodey, T.W.¹, Gerales, P.³, Oliveira, N.³, Hervias, S.³, Henriques, A.³, Silva, C.³

¹Royal Society for the Protection of Birds, The Lodge, Sandy, Bedfordshire SG19 2DL, United Kingdom, steffen.oppel@rspb.org.uk

²Department of Conservation, Stewart Island Field Centre, PO Box 3, Stewart Island, New Zealand

³Sociedade Portuguesa para o Estudo das Aves, Av. João Crisóstomo 18 - 4^o dto, 1000-179 Lisboa, Portugal

DOI: 10.5073/jka.2011.432.018

Abstract

Non-native invasive mammal species have been eradicated from many islands to conserve native species diversity. The Azores (Portugal) previously hosted very large seabird colonies, but since human colonization and the introduction of rodents (*Rattus rattus* and *R. norvegicus*) and cats (*Felis catus*) many seabird colonies have declined or disappeared as a result of predation. Because the Azores are also inhabited by humans and livestock, we reviewed the challenges associated with the eradication of invasive mammals from inhabited islands in order to plan for a seabird restoration project on the island of Corvo. Detailed analyses of the social, cultural, and economic costs and benefits of eradication are required to increase the probability of the local community supporting the eradication campaign. However, the ecological benefits of eradication are difficult to trade-off against social and economic costs due to the lack of a common currency. Local communities may oppose an eradication campaign because of perceived health hazards, inconvenience, financial burdens, religious beliefs, or other cultural reasons. Besides these social challenges, the presence of humans and domestic animals also complicates eradication and biosecurity procedures. For example, houses, garbage-disposal areas, and livestock-feeding areas can provide refuges for many synanthropic species and so decrease the probability of a successful eradication. Transport of humans and goods to an island increases the probability of inadvertent reintroduction of invasive mammals, and the establishment of permanent quarantine measures is required to minimize the probability of unwanted recolonization after eradication. Most of these challenges exist on Corvo, and continued work with the community is required before an eradication project can be initiated.

Keywords: Azores, cats, Corvo, eradication, invasive mammals, island, rats

Introduction

The introduction and spread of non-native mammals on islands has become a major threat to native island species that evolved in the absence of mammals (Blackburn et al., 2004; Jones et al., 2008). Over the past 40 years, eradications of mammals have reduced the negative effects of non-native mammals on native species (Howald et al., 2007; Towns and Broome, 2003). Most eradication campaigns have been conducted on islands that are not permanently inhabited by humans partly because such operations are less complicated. However, more than half of islands (55%, n=38) where eradication of non-native mammals has a high conservation benefit-to-cost ratio are inhabited permanently by humans (Brooke et al., 2007). Thus, we examined the operational challenges associated with eradications on islands with permanent human populations, in order to prepare a plan for the eradication of Ship rats (*R. rattus*) and feral cats (*F. catus*) from the island of Corvo.

Major challenges for mammal eradication on inhabited islands

Mammal eradications on inhabited islands require more than the consideration of the biological and technical pre-requisites to remove all individuals of a target species. While these basic prerequisites (i.e. by what means a target species can be killed, and whether it is possible to kill all individuals) for successful eradication have received much attention (Zavaleta, 2002), permanent human settlements require the consideration of additional factors including how an eradication campaign will affect human inhabitants, their domestic animals, and human activities. The eradication project must be socially acceptable to the community involved, and social and ecological benefits must outweigh the social and ecological costs. Moreover, the probability of recolonization must be reduced to near zero despite regular

traffic transporting goods that support the island's human population. The removal of all individuals of an invasive target species is also made more difficult when target species can seek refuge in buildings or escape poison bait by accessing alternative anthropogenic food sources.

Lessons from the island of Corvo

Corvo is a 1700 ha volcanic island with ~400 human inhabitants, most of whom make a living through farming, with the principal land use being livestock grazing. Due to inaccessible steep cliffs, eradication of rodents on Corvo would only be feasible through the aerial distribution of poison bait pellets, which may put livestock and feral ungulates at risk of accidental ingestion of poison. In addition, food provided to domestic animals is widely available for invasive rodents, and may reduce attractiveness of poison bait to target animals and thus reduce the probability of successful eradication. Corvo is dependent on imported goods and building materials, which are transported by boat and plane and are currently not inspected or treated for hidden rodents prior to shipment. Biosecurity measures that prevent the accidental re-introduction of invasive mammals would be required at all ports of departure of boats and planes for Corvo, on boats themselves, and around the harbour and airport on Corvo. These quarantine measures would have to be maintained in perpetuity and could significantly increase the cost of living on Corvo.

Most people on the island favour the idea of eradicating rats from Corvo. Because rats serve as prey to both domestic and feral cats, the eradication of rats alone may increase the adverse impact of cats on seabirds (Bergstrom et al., 2009; Caut et al., 2007), and seabird populations would therefore benefit from a combined rat and cat eradication. Many people support eradication of feral cats, but are opposed to removing domestic cats. This increases the operational complexity of feral cat eradication because it is often difficult to distinguish feral and domestic cats, and more labour-intensive methods would be required for feral cat eradication. Ongoing research and community involvement will decide whether rat and cat eradication on Corvo is feasible.

References

- Bergstrom DM, Lucieer A, Kiefer K, Wasley J, Belbin L, Pedersen TK, Chown S L 2009 Indirect effects of invasive species removal devastate World Heritage Island. *Journal of Applied Ecology* 46: 73-81
- Blackburn TM, Cassey P, Duncan RP, Evans KL, Gaston KJ 2004 Avian extinction and mammalian introductions on oceanic islands. *Science* 305: 1955-1958
- Brooke MD, Hilton GM, Martins TLF 2007 Prioritizing the world's islands for vertebrate-eradication programmes. *Animal Conservation* 10: 380-390
- Caut S, Casanovas JG, Virgos E, Lozano J, Witmer GW, Courchamp F 2007 Rats dying for mice: modelling the competitor release effect. *Austral Ecology* 32: 858-868
- Howald G, Donlan CJ, Galván JP, Russell JC, Parkes J, Samaniego A, Wang Y, Veitch D, Genovesi P, Pascal M, Saunders A, Tershy B 2007 Invasive rodent eradication on islands. *Conservation Biology* 21: 1258-1268
- Jones HP, Jones HP, Tershy BR, Zavaleta ES, Croll DA, Keitt BS, Finkelstein ME, Howald GR 2008 Severity of the effects of invasive rats on seabirds: A global review. *Conservation Biology* 22: 16-26
- Towns D, Broome K 2003 From small Maria to massive Campbell: forty years of rat eradications from New Zealand islands. *New Zealand Journal of Zoology* 30: 377-398
- Zavaleta ES 2002 It's often better to eradicate, but can we eradicate better? In: Veitch CR, Clout MN (eds.) *Turning the tide: the eradication of invasive species*. International Union for Conservation of Nature Invasive Species Specialist Group. p. 393-404, Gland, Switzerland