

 <p data-bbox="215 533 454 571">Agreement on the Conservation of Albatrosses and Petrels</p>	<p data-bbox="497 241 1385 324"><b>Seventh Meeting of the Population and Conservation Status Working Group</b></p> <p data-bbox="667 342 1385 380"><i>Edinburgh, United Kingdom, 18 - 19 May 2023</i></p> <p data-bbox="635 459 1236 504"><b>The Mouse-Free Marion Project</b></p> <p data-bbox="555 593 1316 672"><b><i>Anton Wolfaardt (Mouse-Free Marion Project), Azwianewi Makhado (South Africa)</i></b></p>
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## 1. THE MOUSE-FREE MARION PROJECT: BACKGROUND

Marion Island is the larger of the two Prince Edward Islands, a sub-Antarctic island group in the south-west Indian Ocean. House Mice *Mus musculus*, inadvertently introduced by sealers in the early 19<sup>th</sup> century, continue to have a devastating impact on the ecology of the island. Through predation, mice have greatly reduced invertebrate densities and biomass at Marion Island (McClelland et al. 2018). In addition to threatening many populations of endemic invertebrates, the depletion of primary consumers and detritivores has undermined important ecological processes, such as energy flow and nutrient cycling (Smith et al. 2002).

The Prince Edward Islands are globally important breeding sites for seabirds (including ACAP-listed species such as Wandering, Grey-headed and Sooty Albatrosses) and other wildlife, and in 1995 were recognised as a Special Nature Reserve, the highest level of protective status under South African legislation. As the authority responsible for the management of the Special Nature Reserve, the South African Department of Forestry, Fisheries and the Environment (DFFE) is responsible for eradicating mice from Marion Island, which the Mouse-Free Marion (MFM) Project is designed to achieve through a partnership with BirdLife South Africa (BLSA).

A trend towards a warmer and drier climate over the last 30 years has resulted in a shift to an earlier, and thus extended, breeding season for mice, leading to a substantial increase in their densities on the island each summer (McClelland et al. 2018). This, together with an ongoing reduction in invertebrate biomass, has driven mice to find alternative food sources, including the eggs, chicks and increasingly adults of many of the island's globally important (and ACAP-listed) seabirds (e.g., Dilley et al. 2016, 2017, 2018, Jones et al. 2018).

The scale and frequency of attacks on seabirds have been increasing since they were first observed in the early 2000s and have escalated dramatically since 2015 (Dilley et al. 2016). Left unchecked on Marion Island, the mice may eventually cause the local extinction of 19 of the 28 seabird species that breed on the island (Preston et al. 2019).

Several studies have considered options for the control or eradication of House Mice from Marion Island (Angel and Cooper 2011, Parkes 2014). There are no cost-effective ways of controlling mice on the island in a way that would benefit native wildlife over a meaningful period of time. Until relatively recently, there was also no realistic prospect of removing mice from Marion Island, or indeed from many of the other sub-Antarctic islands whose wildlife was suffering from rodent predators. However, over the last 30 years significant advances in techniques and technology have been developed to eradicate rodents from islands. This has led to increasingly ambitious and successful island eradication initiatives (Spatz et al. 2022), paving the way for eradication campaigns on large islands such as Marion to be considered.

Aerial broadcasting of rodenticide bait has become the standard method used in rodent eradications on islands, and is the only method that has been used successfully on large oceanic islands. The use of increasingly advanced tracking and mapping technology such as Global Positioning Systems (GPS) and Geographical Information Systems (GIS) has increased the accuracy and efficacy of aerial-based eradication interventions.

A study by an international expert concluded that it is feasible to eradicate mice from Marion Island (Parkes 2014). Informed by the outcomes of this feasibility study and internationally agreed best practice (Keitt et al. 2015, Broome et al. 2017a,b), DFFE and BLISA are collaborating to implement a mouse eradication operation, the MFM Project, to restore Marion Island and to improve the conservation status of its seabird populations.

## **2. THE MFM OPERATION**

The MFM baiting operation will involve the distribution of cereal-based bait pellets containing the second-generation anti-coagulant toxicant, brodifacoum. These are distributed from bait buckets that are slung beneath helicopters. The method relies on comprehensive coverage of every part of the island, primarily by flying parallel flight lines at a regular spacing across the island and additional baiting of the coastal margin. The requisite baiting coverage is aided by GPS guidance and flight-line data are then analysed to ensure that no gaps in coverage have occurred. This method, proven in many previous operations worldwide, is considered to be the only option currently available that will enable the eradication to be successful, and was recommended in the feasibility study (Parkes 2014). Subsequent to this, a draft Operational Plan has been prepared, and is subject to ongoing review, to guide the implementation of the MFM Project.

### **2.1. Environmental and ethical considerations**

Brodifacoum is the most effective toxicant currently available for the eradication of rodents from islands using aerial baiting techniques and adheres to best practice guidelines for mouse eradication operations (Broome et al. 2017b). As brodifacoum is highly insoluble in water, baiting will have ephemeral and at most very minor effects on soil, water and vegetation, which will result in the toxicant being degraded to its constituent components (carbon dioxide and water) over the course of weeks to months by microorganisms in the soil or sediment. What little bait that enters the ocean will be quickly broken up by wave action and dispersed, due to

the highly dynamic nature of the coastal zone. The toxin will bind to sediments until broken down into its constituent parts.

Brodifacoum is, however, also toxic to non-target vertebrate species, particularly to mammals and birds. Thus, a requirement for maximising efficacy and ensuring a safe and ethical approach, is an understanding of the risks of its use and the ability to mitigate them. Overall, the effects on non-target species are well enough understood to enable planning to minimise impacts on non-target species. As part of this process, the MFM Project has appointed an expert Advisory Panel, chaired by Prof. Peter Ryan to assess the risks of the application of the brodifacoum bait on non-target birds and mammals at Marion Island, and to recommend how best to address and mitigate these risks.

The decision to use lethal methods to eradicate mice and restore the ecological integrity of Marion Island is guided by the evidence of harm, the lack of alternative non-lethal means and the anticipated conservation gains, which substantially outweigh any detrimental outcomes resulting from the intervention. From an ethical perspective, doing nothing is not a neutral position. For Marion Island, the cost of doing nothing will be that most seabird species breeding on the island continue to suffer and are likely to be driven to local extinction. Taking action to address the threat, rather than knowing what is at stake and taking no action, represents a responsible, ethical, and compassionate approach to the conservation of the island and its native inhabitants. A comprehensive assessment of alternative approaches to solving the problems caused by House Mice on Marion Island has been undertaken, and forms part of an application for ethics approval from the DFFE Ethics Committee.

The MFM Project team has also undertaken a rigorous assessment of the potential environmental impacts of the baiting operation. The outcomes of these assessment processes, which are currently being reviewed by the DFFE, form part of the ongoing planning process. The MFM Project is designed and will be implemented to cause the least possible harm to naturally occurring species. However, it is not possible to conduct a rodent eradication project whilst causing no harm to naturally occurring species. So, while there will inevitably be some harm to individuals of a small number of species, this is not considered likely to be in the realm of significant or long-term population-level impacts. A fundamental principle of island eradication and restoration efforts is that the ecological benefits must exceed the costs, which include the risks to non-target species. Given the ecosystem-wide impacts of mice at Marion Island there is little doubt that the long-term benefits of a successful eradication will outweigh the short-term costs.

### **3. CURRENT PROJECT STATUS**

The MFM Project is currently in the planning and preparatory phase, the most time-consuming component of the project. This includes establishing the governance and management structures for the project, formalising the partnership arrangements, appointing core project staff for the initial phase of the project (Project Manager, Operations Manager, Chief Philanthropy Officer and Communications Officer) to progress the project planning, and to undertake the various assessments and obtaining the necessary authorisations. These include

a range of environmental authorisations, authorisations for the use of the rodenticide bait and various authorisations from the South African Civil Aviation Authority with respect to the operation of helicopters at Marion Island.

One of the common factors in successful eradications is that the quality and level of detail of the planning largely determines the quality and success of the outcome. The planning and preparatory activities encompass the development of various project plans, including plans that outline the governance and management mechanisms for the project, the technical and logistical details of the operational baiting strategy (the Operational Plan), an assessment of the environmental effects and non-target species impacts of the operation together with mitigation measures to minimise any adverse impacts.

The planning and preparatory phase also incorporates the various processes to obtain all the regulatory requirements, and importantly to raise the funds necessary to complete the project. Subject to the completion of these processes, and having secured the funding required by early 2024, we are working towards the baiting operation taking place in the austral winter (April-September) of 2025. If this is not achieved, the operation will need to be deferred. It will only proceed once we have the full funding and have fully and meticulously completed all the planning and preparatory work, as well as obtained all the necessary authorisations.

The MFM Project website ([www.mousefreemarion.org](http://www.mousefreemarion.org)) and social media channels (Facebook: **Mouse-Free Marion**; and Instagram: **@mousefreemarion**) provide further details about the project, and regular updates of project progress.

We invite the Population and Conservation Status Working Group, ACAP and ACAP Parties to follow our progress, and endorse and support the MFM Project, which aims to help achieve a more favourable conservation status for Marion Island and its globally important seabirds, including a number of ACAP-listed species.

#### 4. REFERENCES

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