

# Research Prospectus 2022

## Rabbit-Free Australia

Foundation for Rabbit-Free Australia Inc. is an environmental charity with a vision of Australian landscapes free of their most notorious pest – the European wild rabbit. The Foundation supports research, raises awareness and encourages on-ground action to eradicate wild rabbits from Australia.

## Call for Proposals

Foundation for Rabbit-Free Australia has four main aims for research and development:

- **About Rabbits.** To understand the impacts and characteristics of European wild rabbits, enabling the design of better control techniques and control programs.
- **Biological controls.** To enable better biological control of European wild rabbits in Australia.
- **Implementation.** To optimise the application of knowledge and technology, regarding biological and physical options, for greater control of European wild rabbits in Australia.
- **Research capacity.** To ensure Australia has adequate, continuing rabbit control research capacity, and that it is effectively and efficiently applied

The Foundation invites proposals for small grants to meet those aims and address the priorities and underlying research questions outlined in the following pages, within the context and subsequent discussions of research topics.

## Research niche

The Foundation is a not-for-profit, publicly subscribed fund. As a relatively small organisation it is not in a position to fully fund large research proposals. Rather it provides support for small projects (typically in the order of \$5,000 - \$15,000), such as proof of concept, student research projects, or critical supplemental equipment or activity to optimise larger projects. Ideally, support from the Foundation will act as a catalyst, encouraging and enabling research and the application of new and improved forms of rabbit control.

## Applications

- This call is for projects commencing in 2022. Proposals are due by **Friday, 18 February, 2022.**
- An application form with lodgement details is attached.
- Successful proponents will be required to provide regular project updates and a brief final report, suitable for public release.
- Please feel free to circulate this Prospectus to others who may be interested in applying.
- Examples of [former projects](#), and [membership](#) options, can be found at the Foundation's website.

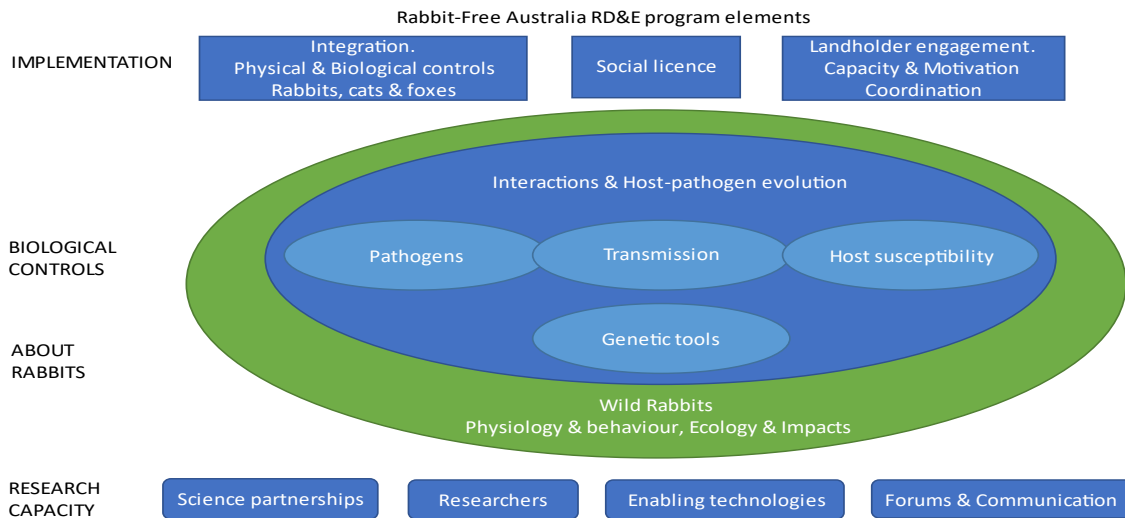
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## Summary

### Graphic Summary



## Aims & Priorities

### About Rabbits

**Aim:** To understand the impacts and characteristics of European wild rabbits, enabling the design of better control techniques and control programs

**Priorities:**

- Rabbit physiology & sociology
- Rabbit ecology
- Environmental & economic impacts

### Biological controls

**Aim:** To enable better biological control of European wild rabbits in Australia.

**Priorities:**

- Biological controls
- Transmission
- Susceptibility
- Genetic tools
- Host-Pathogen dynamics

### Implementation

**Aim:** To optimise the application of knowledge and technology, regarding biological, chemical and physical options, for greater control of European wild rabbits in Australia.

**Priorities:**

- Integrated techniques
- Landholder engagement
- Social licence

### Research capacity

**Aim:** To ensure Australia has adequate rabbit control research capacity, and that it is effectively and efficiently applied

**Priorities:**

- Science partnerships
- Supporting researchers
- Science forums
- Enabling technologies

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## Context

Since the mid-1950s, a series of successful rabbit bio-control programs (myxomatosis, European rabbit fleas and calicivirus) have generated more than \$70 billion of benefit to livestock industries and stimulated the recovery of native vegetation and associated fauna over vast areas of Australia. They have shown well-researched biological controls to be safe, extremely cost-effective, and universally beneficial due to their spread regardless of property boundaries and management.

For much of Australia, bio-controls are the only cost-effective option available. Unfortunately, their success risks complacency as the latent breeding capacity of rabbits and the likely attenuation of bio-controls over time are overlooked, and the impact of low densities of rabbits goes un-noticed.

Given the long lead times for bio-control development, it is imperative that such work is always underway and, because bio-controls do not operate in isolation from each other it is important to also understand their interactions. Furthermore, existing biological controls on their own will not be sufficient for optimal environmental benefit. Physical control is necessary through programs that integrate a mixture of physical and biological control methods and target feral predators as well.

Good information on the environmental, economic and social impacts of rabbits, is required to ensure rabbit control and research is still given adequate priority, and to help engage communities in integrated control programs. These imperatives stand amidst a changing climate, accelerating change in technologies and communication, evolving rural and peri-urban communities, and public sentiments requiring humane and ethical operations from labs to the field.

This document presents the aims, priorities and research questions of interest to Rabbit-Free Australia. They have arisen in the course of operations and from enquiries to the Foundation from land managers, regulators and researchers, which reflect the environment in which the Foundation operates. Examples of potential projects are included in subsequent Discussion sections, but they should not constrain potential research projects. Project proposals that meet the aims, priorities and research questions, but do not address a discussed topic or project example, will not be at a disadvantage compared to those that do.



*Grazed vs Un-grazed. Only after rabbits were excluded did un-grazed vegetation recover.*

For detail on the Research Aims, Priorities & Questions, see:

- [About Rabbits](#)
- [Implementation](#)
- [Biological Controls](#)
- [Research Capacity](#)

# Research Prospectus 2022



## About Rabbits

**Aim: To understand the impacts and characteristics of European wild rabbits, enabling the design of better control techniques and control programs.**

### Research questions

- **Rabbit physiology and sociology:** Which features of European wild rabbits can be exploited to enhance their control?
- **Rabbit ecology – plant and animal interactions:** What factors most influence the distribution and abundance of European wild rabbits and the plants and animals that they subsequently influence?
- **Environmental and economic impacts:** What are the social, environmental and economic costs of European wild rabbits to Australia?

### Discussion

The physiology, genetics and social behaviour of rabbits in the wild are well understood, but there are many subtle complexities we could know more about – especially in the context of modern landscapes, bio-controls and climate change (including bushfire regimes). Several of those factors add stresses to typical seasonal variability and the ‘boom and bust’ cycle of rabbit populations, but little is known of how rabbits respond to extremes and new stresses.

As an example, are there preferred warrens that once vacated will be quickly repopulated from less desirable ones following a ‘bust’? If so, what are their characteristics and could those sites be ‘farmed’ (used as sinks from which rabbits are periodically culled)? How do rabbits and other feral and native animals compete for access to warrens, and how might it change after a ‘bust’?

Across Australia there is growing interest in nature reclamation, from national threatened species programs to land-holders creating private sanctuaries. Feral predators are often controlled, but what of rabbits and their impacts in such areas? What level of rabbit control is sufficient for conservation outcomes – and how does that vary across bio-regions? Which species of plant are most at risk from low density rabbit grazing in each bio-region? Given that the incidence and nature of bushfires may vary with climate change, which plant species in each bio-region are at most risk from grazing by rabbits in post-bushfire environments, and how does that affect long term environmental recovery?

Changes in climate may also affect the distribution and abundance of rabbits. There is good understanding of the environmental niches most preferred by rabbits and fair information on the genetics of wild rabbits in Australia. However, a better appreciation of how changes in climate and climate extremes might affect the distribution of rabbits and different bio-controls would provide insight for future research and long-term planning for rabbit control.

Planning strategic rabbit control requires a better understanding of the web of relationships between wild rabbits and the flora and fauna with which they interact, and the nature, extent and cost of rabbit impacts, including:

- Productivity and profitability of various primary production sectors, including social costs.
- Native vegetation growth and regeneration at the species and community level, including following fire or other episodic events.
- Relationships between rabbits, feral predators and native fauna.

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## Biological Controls

**Aim:** *To enable better biological control of European wild rabbits in Australia.*

### Research questions.

- **Biological controls:** Which biological controls hold most potential for future use in Australia?
- **Transmission:** What will optimise the transmission and effectiveness of biological controls in Australia?
- **Susceptibility:** How can the effectiveness of biological controls be maximised?
- **Genetic tools:** Which genetic technologies could have application in controlling European wild rabbits and what are the most likely obstacles?
- **Host-pathogen dynamics:** How are bio-controls operating in the field?

### Discussion

There is now nearly 70 years of experience with rabbit bio-controls in Australia, and data of various types and quality to describe aspects of that history. Data from long-term monitoring sites has been 'mined' on occasions and there is potential for more such studies. There is also scope to improve monitoring overall and to supplement traditional methods with new techniques, such as genetic sampling or remote sensing.

Relationships between rabbits and bio-controls are dynamic with changes over time in susceptibility and virulence - sometimes maintaining an effective equilibrium, but always with the risk of reduced effectiveness. There are also dynamic interactions between the bio-controls, which affect their field performance.

Understanding the interactions between various bio-controls and rabbits, and any changes in their virulence and the susceptibility of European wild rabbits over time will help in the development of new bio-controls and in planning the strategic use of current ones. A related question is what influences any varied susceptibility of rabbits to biological controls and how the effectiveness of control agents can be optimised in different bio-regions?

A better understanding of how biological control agents are transmitted and how to optimise transmission and infection would enhance the control of wild rabbits. Rabbit reproduction and the transmission of bio-controls are heavily influenced by seasons, another aspect of host-disease and disease-disease relationships. Any change in when rabbits are most vulnerable will change the timing and nature of their impact on primary production, native plants and ecosystems. How might climate change alter the relationships between hosts, diseases and their consequences?

The more knowledge we have of these dynamic relationships the easier it is to design highly effective control programs and to optimise the impact of bio-controls, including ensuring they do not undermine the effectiveness of one another.

Bio-prospecting (searching for new bio-controls and transmission agents), testing and planning the release of biological controls, and exploring emerging genetic technologies (e.g. modelling their effectiveness and proof of concept trials) are perennial opportunities for break-throughs in rabbit control, as are novel technologies and methodologies to support research and testing.



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## Implementation

**Aim:** *To optimise the application of knowledge and technology, regarding biological, chemical and physical options, for greater control of European wild rabbits in Australia.*

### Research questions

- **Integrated techniques:** How can the effectiveness of biological and physical rabbit control techniques be optimised?
- **Landholder engagement:** What approaches will optimise landholder engagement and commitment to the control of European wild rabbits?
- **Social licence:** What issues are important to maintain a social licence for rabbit control technologies and how can they best be addressed?

### Discussion

An essential first step in designing an integrated rabbit control program is to know where rabbits are and how many there are. With the growth in environmental monitoring technologies, what tools can be applied to help landholders and resource management agencies more readily locate and map the incidence of rabbits and warrens at property and district scales? What environmental monitoring technologies could record and report the incidence of rabbits at regional and even national scales?

Rabbit control must be increasingly sensitive to environmental and cultural issues, especially in areas of environmental or cultural heritage significance, or in peri-urban areas. In peri-urban areas, land owners can face difficulties in understanding which agencies control what or can provide assistance, and what, if any, approvals or accreditation is required before control can occur. There is scope for the development of low-impact control mechanisms to supplement bio-controls in those areas (e.g. targeted use of low-dose poisons) and for a review, and possible rationalisation, of regulations.

Better understanding is needed (on a bio-regional basis) of how to improve, and better sequence and coordinate different biological and physical control techniques, while integrating them with feral predator controls. The development of novel physical control methods, machinery, software applications, or remote sensing technologies could assist in the design of such programs. Detailed understanding of public sentiments and information needs, and facilitating appropriate responses (such as guidelines for humane control measures or research procedures) may also be required.

In many agricultural and pastoral areas, as well as in peri-urban and more intensive production environments, a wide diversity of views and interests can now be found within a community. Examples of how that diversity can be respected and brought together for collaborative rabbit/pest control programs exist, but there is great scope to increase the understanding and application of the key principles for success.

More input from social researchers into barriers to adoption and barriers to collaboration would also improve community responses to environmental challenges. It could generate better understanding of the relative importance of capacity building, technical training, motivation, awareness through citizen science and coordination needed to enable effective rabbit control programs.



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## Research Capacity

**Aim: To ensure Australia has adequate rabbit control research capacity, and that it is effectively and efficiently applied.**

Desired outcomes.

- **Science partnerships:** Shared knowledge of research activities, enabling information sharing and collaboration.
- **Supporting researchers:** Attracting, supporting, retaining and upskilling Australian rabbit researchers.
- **Science forums:** Broad, shared understanding of rabbit issues, priorities and solutions.
- **Enabling technologies:** New techniques to facilitate faster, more effective and more cost-efficient research into rabbit control technologies.

## Discussion

Research funding models can make it hard for researchers with an interest in rabbits to develop a career with that focus. The Foundation is particularly keen to help researchers in their early career stages – be that additional training, support for field work, or attendance at worthwhile conferences. Small competitive grants to support post-graduate projects, and for personal development and scientific exchanges for Australian and international researchers, may help attract new researchers and retain existing ones.

The Foundation accepts a responsibility to periodically play a lead role in drawing attention to rabbit research issues and priorities and to provide opportunities for interested parties (such as land managers, researchers or research investors) to share insights and information. It requires collaboration and encouragement for the Centre for Invasive Species Solutions, universities, CSIRO, government departments and other research and development bodies, and their funders. It may also involve facilitating forums and contributing to discussions initiated by others.

When matters that would enhance the operation of rabbit research are drawn to the Foundation's attention (e.g. enabling technologies), consideration will be given to what role may be played to assist in an appropriate response. It could involve assistance in developing new laboratory, field sampling, or mapping techniques.



*Research capacity - supporting field work by researchers.*

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## Foundation for Rabbit-Free Australia Inc

### RFA Charter:

Foundation for Rabbit-Free Australia Inc. manages a fund to support research, raise awareness and encourage on-ground action to eradicate invasive rabbits from Australia. It is Australia's only publicly-subscribed fund to focus its activities on eradicating the continuing impacts wrought by European wild rabbits on our primary industries and our unique native biodiversity.

### Aims:

The Foundation's aims are to:

- Increase awareness and understanding of the nature and extent of degradation caused by rabbits, the continuing threat they pose to Australia's economic, environmental and social values, and the need for research into integrated control measures.
- Support research, development and extension, including projects, researchers and research organisations, contributing to the eradication of wild rabbits in Australia.
- Encourage on-ground measures that contribute to the eradication of wild rabbits, such as integrated control programs applying the latest research results.

### Symbols:

#### **Our Emblem:**

The Bilby (*Macrotis lagotis*) is an Australian native animal that has faced extinction due, in large part, to European wild rabbits.

#### **Our Mascot:**

The Easter Bilby champions the Foundation's cause – reclaiming the bush for Australian flora and fauna. The Foundation is the registered holder of the trademark 'Easter Bilby' and is pleased to work with chocolate manufacturers and story-tellers using Easter Bilby to promote the rabbit control cause and a theme of 'bilbies not bunnies'.

### The Problem:

European wild rabbits are introduced, invasive pests throughout much of Australia, causing considerable harm to the natural environment and to primary production.

Their impact on native ecosystems includes:

- Competition for food and shelter
- Selective grazing of preferred plant species, resulting in low or nil recruitment and subsequent ecological change
- Maintaining fox and feral cat populations, resulting in increased predation of native animals and contributing to the extinction of some species
- Soil erosion and weed incursions, and associated impacts on vegetation, wetlands and watercourses.

Their impact on primary industries includes lost production (crops and pastures, horticultural, viticulture and nursery plantings, and revegetation or commercial forestry seedlings) plus control costs, soil erosion and weeds. Rabbits can also undermine and damage public and private infrastructure throughout their range.

More information is available at the Foundation's website – [www.rabbitfreeaustralia.org.au](http://www.rabbitfreeaustralia.org.au).