





## Seeking innovations to protect communities and prevent extinctions



**L**ike you, we want to preserve our world for generations to come. Every year damaging, introduced (invasive) rodents threaten native island wildlife and ecological integrity. Scientific research suggests that today such losses may be preventable.

Our world's island communities, plants, and wildlife are in crisis due to damaging invasive species, the leading cause of extinctions on islands. Invasive species are also the second greatest cause of plant and animal species loss globally. Rodents have invaded nearly 90 percent of our world's islands and transmit dangerous diseases to humans (e.g. Hantavirus and the plague). And globally, the cost of invasive species' impact and control efforts is an estimated five percent of the world's annual economy.

There is hope. Five hundred successful invasive rodent removal projects on islands demonstrate that eradication is one of the most impactful conservation interventions available to prevent island extinctions and benefit island communities and ecosystems.

Yet, these interventions are insufficient to match the magnitude of this global crisis. Today, rodenticides are the only effective tools for removing or controlling invasive rodents on



large islands, and there are social, ethical, ecological, and financial constraints that limit this conservation method.

## **The Genetic Biocontrol of Invasive Rodents (GBIRd) program**

is a partnership of diverse experts from seven world-renowned universities, government, and not-for-profit organizations advancing gene drive research. This partnership has potential to scale up efforts to protect island communities and prevent island species extinctions.

*Gene drives are systems of biased inheritance that enhance the ability of a genetic element to pass from an organism to its offspring through sexual reproduction. A wide variety of gene drives occur in nature. Researchers have been studying these natural mechanisms throughout the 20th century...*

[National Academy of Sciences “Gene Drives on the Horizon” \(2016\)](#)

We are investigating both the feasibility and suitability of this potential tool. Our step-wise, values-based, scientific, ecological, social, and ethical investigations and risk-assessments aim to answer the following key questions in the coming decade:

*Could we create a self-limiting gene-drive modified mouse that biases future generations to be male (or female) only, thereby achieving eradication by attrition? If so, should we do it? Under what conditions?*

Together, we will find the answers.  
**ENGAGE TODAY!**

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Get the latest **GBIRd news** and updates  
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Questions, comments, suggestions?

Contact us at [info@geneticbiocontrol.org](mailto:info@geneticbiocontrol.org)

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We will launch a comprehensive website  
later this year.

**Seeking a transformative innovation to responsibly prevent extinctions  
and protect communities**

The Genetic Biocontrol of Invasive Rodents program (GBIRd) is a partnership of seven  
world-renowned organizations.





## Could we do it?

The research goal is to use a naturally-occurring (t-complex) and/or CRISPR “gene drive” in mice to facilitate a bias of subsequent rodent generations to all be a single sex. If successful, GBIRd’s proof of concept holds the potential to significantly expand conservationist’s toolbox to reverse the impacts that invasive rodents have on islands, their terrestrial and marine ecosystems, and human communities.

## Should we do it?

We know that critical questions remain to be answered and careful assessments are necessary. Learn more about North Carolina State University’s (NCSU) multidisciplinary investigations [here](#).

*Gene-drive modified organisms hold promise for addressing difficult-to-solve challenges, such as the eradication of insect borne infectious diseases and the conservation of threatened and endangered species. However, proof-of-concept in a few laboratory studies to date is not sufficient to support a decision to release gene-drive modified organisms into the environment. The potential for gene drives to cause irreversible effects on organisms and ecosystems calls for a robust method to assess risks. A phased approach to testing, engagement of stakeholders and publics, and clarified regulatory oversight can facilitate a precautionary, step-by-step approach to research on gene drives without hindering the development of new knowledge.*

National Academy of Sciences “Gene Drives on the Horizon” (2016)

## The GBIRd Partnership aims to find out



GBIRd brings together world class geneticists, evolutionary biologists, ethicists, risk assessors, math modelers, regulatory experts, social scientists, and conservation professionals to engage one of the most serious threats to biodiversity today: unchecked invasive rodents on islands.

Our not-for-profit conservation and humanitarian mission engages experts from governments, NGOs, and research universities including [CSIRO](#), [Island Conservation](#), [North Carolina State University \(more resources\)](#), [Texas A&M University](#), [University of Adelaide](#), and [USDA's APHIS](#). Together, we are cautiously investigating the feasibility of, and assessing the social, ethical, and biological risks of, gene-drive modified organisms for eradication of island invasive species. While the science and partnership have been underway for several years, GBIRd's formalized coordination and strategy emerged in 2016.

## **This will take time**

We are probably a decade away from answering all these questions. Yet, we have an obligation to undertake this research in a cautious, thorough, and step-wise way. We benchmark our assessments against the world's leading gene drive research and [public values alignment guidelines like these](#) issued by the US National Academy of Sciences and others. The diversity of assessments will need to run their course before we can collectively ask *Could we? Should we? Under what conditions?*

## **Values are central**

We are all in this for the interests of society and nature. Like you, we want to save lives, support livelihoods, and preserve our natural world for generations to come. Our guiding principles include:

1. Early and sustained consistent engagement with stakeholders and communities
2. Proceed cautiously, with deliberate step-wise methods and measurable outcomes;
3. Engage early and often with the research community, regulators, communities and other stakeholders;
4. Maintain an uncompromising commitment to biosafety, existing regulations, and protocols as minimum standards (e.g. NASEM, 2016; AAS, 2017);
5. Use, and participate in developing best practices;
6. Only operate in countries with appropriate regulatory capacity; and
7. Be transparent with research, assessments, findings, and conclusions.



The investigation of the suitability of gene drive approaches for conservation, food security, and human health purposes requires time, expertise, and collaboration. We acknowledge that others, or perhaps us, many years into the future when this technology has proven to be safe, effective, and socially acceptable, may want to approach larger invasive rodent issues on larger populated islands or mainlands for food security and human health purposes. However, today our sole focus is invasive rodents on islands. Together, we can determine if, when, and how we should proceed with this new technology.



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26

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25

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20  
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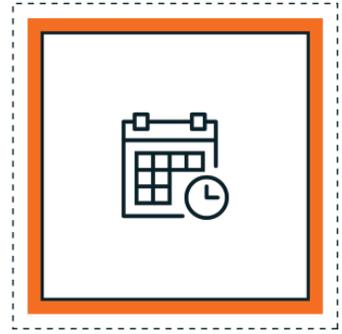
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