



# Pacific Invasive Species Battler Series

## INVASIVE ANIMAL SUPPRESSION SUPPLEMENTARY RESOURCE • FICTITIOUS WORKED EXAMPLE


# FEASIBILITY ASSESSMENT REPORT FOR SUPPRESSING RATS AND CATS, MANGAPIKO ISLAND, 2024–2034



Department of  
Conservation  
*Te Papa Atawhai*



**SPREP**  
Secretariat of the Pacific Regional  
Environment Programme



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*Our vision: A resilient Pacific environment sustaining our livelihoods and natural heritage in harmony with our cultures*



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## About this document

This example Feasibility Assessment was created to show how the template could be completed. None of the content is real. Mangapiko Island does not exist and there is no manulavalava bird. While the suppression design and methods may be suitable for this fictitious situation, they may not be suitable for your proposal. Seek advice on what is best for your situation.

This document supports the Invasive Animal Suppression Framework outlined in the Battler guide *Use a framework to plan and implement an invasive animal suppression project*.

<b>Author: Joseph Manaia</b>		<b>Date: 24 November 2023</b>
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1	Draft for review	6 November 2023
2	Peer reviewed final	24 November 2023

## 1. Executive summary

This report assesses the feasibility of rat and cat suppression near the village of Pangatu on Mangapiko Island to protect the endangered manulavalava burrowing petrel. The project aims to increase the manulavalava population by improving breeding success. Suppressing invasive predators from December to March each year, when the birds are most vulnerable, should allow at least 75 per cent of manulavalava chicks to survive. The project must be sustained for at least ten years – with a year one cost of about NZD \$175,000 and an annual cost of about \$150,000 – to make a difference to the adult population.

The project is technically achievable and has good support from stakeholders although no funding commitments have been made yet, pending this assessment of feasibility. Local residents of Pangatu fully support the goals and proposed methods of the project but have very limited resources to contribute. Apart from finding stable financial partners, the biggest risk is in a potential need to scale up the predator suppression in response to increasing bird breeding locations and/or re-invasion of feral cats at higher levels than expected. It is critical that both rats and cats are effectively suppressed to achieve the desired outcomes.

This project is critical to the survival of manulavalava worldwide and for their continued presence on Mangapiko Island. Based on this feasibility analysis, a primary recommendation is to identify long-term funding partners to allow the project to begin implementation in time for next year's breeding season.



## 2. Introduction

This report assesses the feasibility of setting up and sustaining invasive animal suppression on Mangapiko Island targeting rats and cats to protect the endangered manulavalava bird at the most important breeding site remaining, which is near the village of Pangatu.

## 3. Value(s) for protection, project goals, and scope

### 3.1 The value(s) the project is aiming to protect

The manulavalava is a burrowing petrel once widespread throughout the South Pacific, nesting on high islands with well-established forest soils from December to March. Once fledged, the young birds spend the next three years at sea before returning to their home island to breed for the first time. In historic times, chicks were harvested by local people under strict customary protocols during periods of food shortages. Because of this connection with past cultural practices, the species remains culturally significant for more than 70 island communities where the species once occurred.



FIGURE 1. Manulavalava petrel.

### 3.2 A description of the problem

Over the last 60 years, the manulavalava population has declined, and manulavalava are no longer found on 80 per cent of the islands on which this species was once known to breed. The Mangapiko Island population is the largest remaining with an estimated 45 breeding pairs. Other islands have only a handful of birds returning to breed. A combination of forest clearance and predation by invasive species is the cause of most of this decline. On Mangapiko Island near Pangatu, the forest is largely intact, and invasive ship rats and feral cats are the main predators. Cats feed mainly on the rats and native lizards, but they switch to sea birds during the breeding season, taking chicks emerging from their burrows just before fledging. This predation usually occurs in March at Pangatu.

Ship rats invaded the island only in the last ten years and are found throughout the island in large numbers. They attack manulavalava eggs and young chicks in the burrows. Consequently, the manulavalava breeding success at Pangatu is less than two per cent under the combined attack by rats and cats. Without intervention to suppress this predation, the manulavalava will be lost from Mangapiko Island, likely forever given that there are so few places left in the South Pacific where they can breed safely.

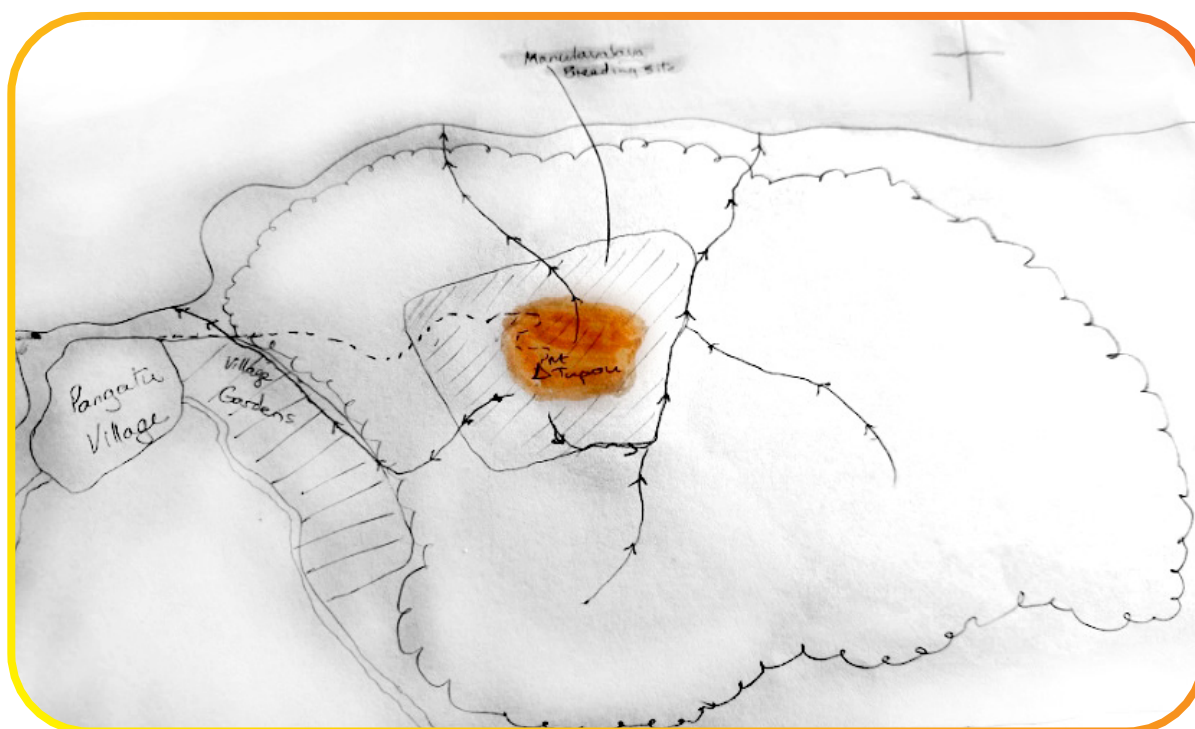


### 3.3 Project goals

Goal area	Result target SMART goal	Outcome target SMART goal
<b>Manulavalava petrel protection 2024–2034</b>	Ship rat abundance is suppressed to less than five per cent tracking tunnel index within the Pangatu breeding area by 1 December each year and maintained below eight per cent until 31 March.	Manulavalava petrel population is increased to 90 breeding pairs within their breeding area by 2034.
	Cats are intensively trapped 1–31 March each year from 2024 through 2034.	Manulavalava petrels successfully fledge 75 per cent of chicks hatched each season from 2024 to 2034.

### 3.4 Treatment site

The Pangatu forest is about 500 hectares. The manulavalava breeding site once covered most of this area but is now concentrated around Mount Tupou (220 metres above sea level) in about 60 hectares. The terrain is steep but not difficult to walk along the few foot tracks throughout the area. The forest near Mt Tupou is dense but becomes more open toward the edges bordering the gardens of Pangatu Village, where 35 families live. Pangatu residents consider themselves to be the guardians of Pangatu Forest although the land itself is owned by the government as a long-term timber reserve. Residents harvest forest fruit from the area and have initiated a weed-management project targeting merremia vine in their surrounding gardens and extending into the forest.



**FIGURE 2. Map of Pangatu forest showing the core area of the breeding site.**

Pangatu forest has most of the native forest birds found on Mangapiko Island with Ngi, Pikopiko, Matata, and Piropiro in good numbers. Rats have affected forest fruit and bird abundance in the opinion of Pangatu residents who remember the area before rats invaded. However, no formal monitoring has been done other than studies on manulavalava breeding.

### 3.5 Scope

#### Within scope of this assessment:

- annual suppression of both rat and cat populations
- result monitoring for rat suppression
- data collection
- some manulavalava petrel outcome monitoring.

#### Excluded from this project:

- result monitoring of cat population because there is no practical way of achieving this at this site
- outcome monitoring design, planning, and analysis of manulavalava petrel population because this part of the project is complex and specialised, requiring expert assistance.

### 3.6 Additional benefits and potential negatives of the suppression project

Forest birds have a similar breeding season to the manulavalava so they may benefit from the rat suppression. Suppression of rats in the Pangatu gardens surrounding the forest will directly benefit the garden production of the local residents. It is unclear whether the suppression of rats will benefit the growth and seeding of merremia vine.



## 4. Technical achievability of suppression and monitoring

### 4.1 Initial monitoring

Fledging success of manulavalava has so far been monitored only occasionally for a small number of burrows. This monitoring effort will have to be expanded to monitor each season and to cover a wider area as new adults return to breed. Initial mapping of breeding burrows is necessary to ensure the suppression effort is in the right place to provide the maximum protection to manulavalava.

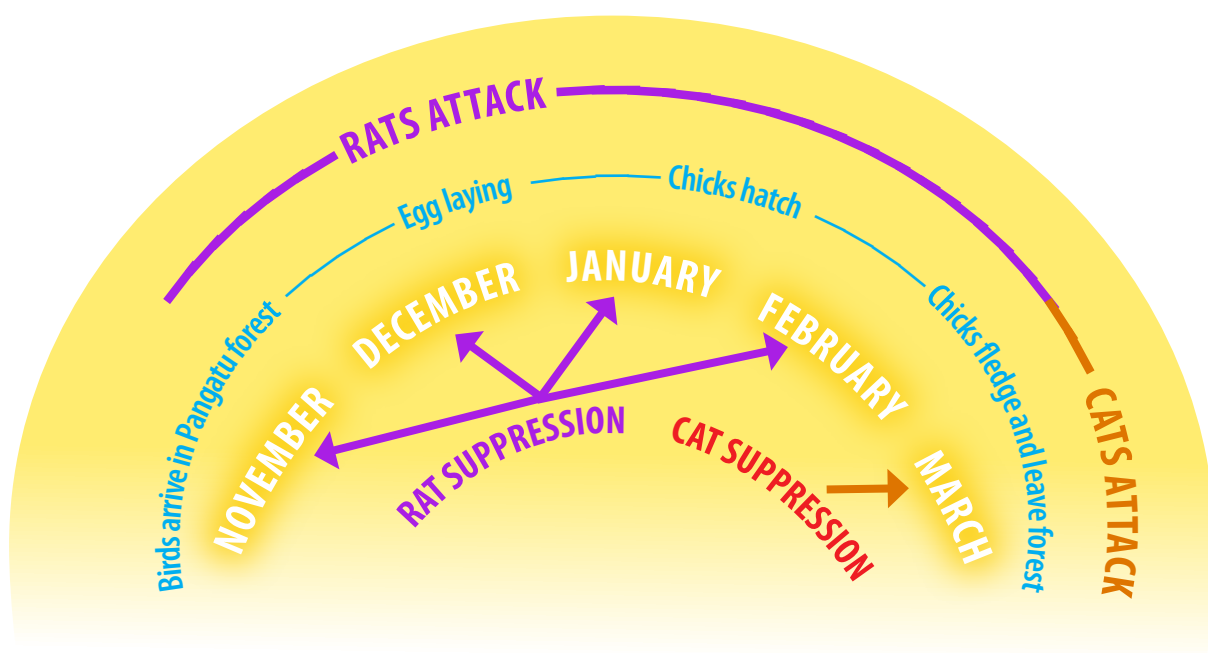
A PRISMSS advisor is confirming the tools, timing, duration, frequency, as well as the data collection and analysis components of the initial monitoring.

### 4.2 Suppression design

#### Timing linked to outcome

We know that rats and cats impact on the manulavalava population at all lifecycle stages (see Figure 3). Rats predate on eggs, chicks, and fledglings from December through to March. Cat predation begins from early March, corresponding to the hatching season.

We need to time our suppression efforts for outcome success. Rat populations will have to be lowered to target levels before manulavalava breeding begins in December. To achieve this population suppression, everything needs to be in place by the end of October, and poison baiting should be ready for the month of November to initially knock down the rat population. Pulses of poisoning will be repeated in January and February to keep the rat populations down. By March, there will be no more eggs and the manulavalava chicks should be big enough to defend themselves against rats. Effort can then focus on cat suppression.



**FIGURE 3: Impact of rats and cats on the manulavalava population against seasonal breeding and migration.**

## Tool options

Trapping will not cope with the high number of rats present. Each year, the rat population will rebound to starting levels within months of the end of suppression effort. Therefore, the project proposes to suppress rats using poison baits in a network of bait stations throughout the forest. The area covered by the rat suppression will need to be revised every four years when information from the bird burrow mapping becomes available. Based on existing knowledge, the rat suppression area will focus on Mt Tupou and extend west towards the Pangatu gardens, a total of 150 hectares. This area may need to expand if burrows are found further afield or if rats cannot be maintained below target levels due to re-invasion from outside the suppression area. The bait station grid will be tight enough to make poison baits available in every rat territory; for ship rats, we estimate this to be a bait station every 50 metres along transects 100 metres apart.

Because cats have large territories and are much less abundant than rats, their suppression requires a sparse grid of traps extending across the whole forest (500 hectares). Even this may not be a large enough area if cats are coming from further away to kill manulavalava chicks at fledging time. Spacing of traps can be every 250 metres on transects 500 metres apart, but the exact location of traps will need to take account of cat behaviour, the terrain, and habitat features which requires some skill to set up in the beginning.

Rat poison bait stations using a tunnel design such as 'Pestoff dead rat café' are well proven in other projects. Anticoagulant poison baits are generally accepted as being safe and effective. Cat traps should begin with kill trap designs such as the 'SA2' because kill traps can be left without checking for several days. However, over time, remaining cats may become difficult to catch with this trap design, and leghold traps may need to be deployed. Leghold traps are very effective but must be set by skilled trappers and, because they hold the cat alive, must be checked daily to avoid unnecessary suffering or risk of escape. This change would greatly increase the workload on project field staff.



FIGURE 4: SA2 Cat trap.

### 4.3 Result monitoring

There is an accepted protocol for monitoring rats using inked footprint tracking cards in tunnels along transects randomly placed throughout the suppression area. Tunnels spaced 20 metres apart are left in place permanently, and tracking cards are placed in the tunnels for a single night to give an index of the population as a proportion of transects showing rat footprints. Annual rat monitoring should occur at the beginning of December and be repeated in March to inform the result targets set.



**FIGURE 5: Footprint tracking card for rats.**

There is no practical way to assess cat populations in this area. Records of captures can provide a rough estimate of a change in abundance by comparing the rate of capture in successive years (cats caught per 100 trap-nights). The more effective monitoring of the success of the cat suppression will be the outcome monitoring of manulavalava fledging success.



## 4.4 Outcome monitoring

Annual monitoring during the first two weeks of December and last two weeks of March will collect data on number of active burrows with eggs and number of chicks nearing fledging. A sample (ten per cent) of active burrows will be monitored with trail cameras during the March work to determine fledging success.

Every four years, a forest-wide survey will attempt to map the number of breeding pairs, and this survey will be used to determine the boundaries of the annual suppression and monitoring effort.

Monitoring seabirds is a specialized task which will require an experienced ornithologist to oversee and to train project staff in field techniques. The annual cost of this monitoring is estimated to be around \$4,000.

## 4.5 Suppression and monitoring technical achievability

If the project can operate at the scale suggested, it has a good chance of reaching result targets and therefore achieving the outcomes. However, the scale of cat suppression required to give adequate protection for vulnerable manulavalava chicks is somewhat unknown, so a tight focus on outcome monitoring is important, and the suppression design will need regular review to ensure the work is focussed on the right place at the right scale. Bird protection projects elsewhere have used similar design and tools successfully. Sustaining the cat suppression will become more difficult if cats become less vulnerable to the kill traps because this change will create a requirement for leghold traps; this change will have even greater impacts if the project scale needs to be increased.

Effective suppression of both cats and rats is vital to achieve the project goal of more manulavalava breeding pairs. Rat suppression alone will simply produce more near-fledging chicks for cats to destroy; cat suppression alone will leave eggs and young chicks vulnerable to rats and therefore not produce the chicks for which the cat suppression seeks to provide protection.

Because these birds first return to breed three years after fledging, the project must be sustained for at least ten years to make a noticeable difference to the adult breeding population. At the end of this period, there should be enough evidence to efficiently plan the future protection of manulavalava.





## 5. Social acceptability

### 5.1 Legality

The suppression tools recommended are legally available with no restrictions other than those applied by the owners of the land where they are used. Permission will be required from the Forestry Commission who administer the Pangatu forest and from any other owners of land within the suppression area.

### 5.2 Communication plan

#### Community and stakeholder details

Community/ Agency/ Stakeholder/ Sponsor	Contact person	Contact details	Project interest What is their interest in the project, and what do they want the project to achieve?	Project concerns What issues or concerns are present, and can they be addressed?
Forestry Commission	George Lucas	<a href="mailto:Glucas@forestry.gov">Glucas@forestry.gov</a>	Administer the Pangatu forest.	Need to consent to project taking place on Commission forest land.
Pangatu Village Council	Pa Whenua	Big House, Pangatu Village	See themselves as guardians of Pangatu forest and share the goals of manulavalava protection. Want to see rat suppression extend into gardens and expand time frames to offer longer seasonal protection from rats.	Concerns over safety of children can be addressed through active involvement of local school and discussion with parents. Concerned that the project will start big and fade away as people lose interest: project requires security of funds for ten years minimum.
Birdlife International	Steve Cranwell	<a href="mailto:Steve@birdlife.org">Steve@birdlife.org</a>	Committed to supporting the project and willing to provide skilled ornithologists for monitoring outcomes.	No concerns.
PRISMSS	Dave Moverly	<a href="mailto:Dmoverly@SPREP.org">Dmoverly@SPREP.org</a>	Committed to supporting the project and willing to provide ongoing technical support	Concerns over sustainable funding for project term of ten years. Project needs long term financial partners.
Mangapiko Local Government	Matiu Potata	<a href="mailto:Matt@mangapiko.gov">Matt@mangapiko.gov</a>	Understands and supports the goals of the project. Sees opportunities for local employment on the project.	Concerns over sustainable funding and people losing interest over time – wants to see a good outreach plan to ensure local people remain engaged and supportive. Wants to see skills development built in for young people to become involved.

## Consents/permissions

Community/ Agency/ Stakeholder	Contact person	Contact details	Type of approval	Approval?	Comments
Forestry Commission	George Lucas	Glucas@ forestry.gov	Permission to operate on Forestry land	Not yet	Positive discussions with George but yet to formally apply for permission until an operational plan is developed.

*Note: a project information sheet has not been developed because the community prefers to rely on verbal communication. Stakeholders want to see the **Operational Plan**.*

## 5.3 Potential positive and negative social consequences of the suppression project

Improving the population of manulavalava will enhance the community pride of Pangatu residents as guardians of the forest. They have already shown commitment in the weed suppression project ongoing for the last four years. Pangatu elders still have memories of bird harvest and would like to see harvesting become an option once again when the manulavalava population is large and stable enough to sustain a small harvest to keep the cultural practices alive.

Involving residents in the project as paid fieldworkers may raise controversy among those not chosen and with respect to an equitable distribution of work. Similarly, accommodating project staff from outside the village in tourist facilities must be seen to be fair and equitable. Further advice and local elder involvement is required to develop a fair system which is supported by locals and can sustain the needs of the project over the long term.

The scale of the project as currently suggested is viable, but any expansion of scale may lead to staff shortages, particularly during peak times for garden management (planting in November and watering in February). There may be opportunities to supplement the workforce during these times with volunteers from off-island. Birdlife International has used this system successfully in other countries.



## 6. Estimate of the cost of the project against scale, time, and frequency

### 6.1 Project structure, capacity, and capability

The project requires a core workforce of 15 people for five months per year, with additional advisory experts engaging periodically.

- A skilled leader and manager is required to manage project finances, data, communications, and forward planning. S/he should be supported by:
  - an operations leader to manage day to day field tasks, field training, and safety;
  - about 12 field staff required for project set-up and three poison baiting pulses per season;
  - three experienced cat trappers required to establish the kill trap network which could then be operated by regular field staff in March each year; and
  - a skilled ornithologist required to oversee the monitoring and data analysis and to provide training to field staff.
- The project should be supported by a technical advisory group who can provide planning advice, answer technical questions, and review progress annually.
- Mapping skills will also be required regularly—this could be a specific role or combined with one of the above roles. Outreach communications will primarily be the responsibility of the project manager, but some key members of the field team may be employed early to help with project set-up communications and outreach with Pangatu residents.

### 6.2 Infrastructure and equipment

Bait station and trapping grids will need to be established and maintained with potential for changes as the project develops in response to results. Workforce members who are not already residents or relatives of Pangatu Village will need seasonal accommodation including a workshop/storage facility for tools and supplies. Secure and dry storage of poison bait will be a necessary part of the storage.





## 6.3 Logistical constraints

The project area is within easy walking distance from Pangatu Village. There is no vehicle access within the forest. Project staff will need to be physically capable of covering around ten kilometres per day in summer temperatures and humidity.

## 6.4 Knowledge gaps and dependencies

The distance that cats are travelling to prey on nesting manulavalava is not well understood. This knowledge limitation has a direct impact on the scale of cat suppression required to reach the outcome goal. While further research into cat movement would be beneficial, it would either confirm the proposed scale or require an expansion of scale. A close focus on monitoring the outcomes may provide the same information while providing protection to the nesting birds. If expansion in scale is required or a move to leghold cat traps is required, the project budget and feasibility should be reassessed.

The outcomes are dependent on both rats and cats being effectively suppressed during the critical times of manulavalava breeding. If one or other of these is not achievable, then the project outcomes are not achievable.

An initial period of ten years is required to make a measurable difference to the breeding population of manulavalava. This longevity requires a sustained commitment from stakeholders and sustainable financing.

## 6.5 Estimate costs and timeline

All costs are presented in NZD (\$).

### Set-up costs

3 Specialist cat trappers for establishment 40 days @ 500 per day = \$20,000

300 Bait stations and transect supplies \$10,000

50 Tracking tunnels \$1,000

50 Cat traps \$5,000

20 Trail cameras \$4,000

**Total set up cost estimate: \$40,000**

### Ongoing costs

12 fieldworkers x 160 days per year x \$280 per day = \$45,000

3 specialist staff x 120 days per year x \$600 per day = \$72,000

Bait and trap lures \$10,000 per year

Miscellaneous materials \$1,000 per year

Accommodation \$5,000 per year

**Total ongoing cost estimate: \$133,000**

### Cost summary (including inflation adjustment at 2.5% per year):

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
173,000	133,000	136,300	140,000	143,500	147,000	150,700	154,400	158,300	162,200

## 7. Decision and recommendation

Feasibility questions	Y/N	Comments or recommendations on any adaptations to make it feasible
Are you clear on what you are doing and why?	Y	
Is your project proposal legal in the country/ territory where it is happening?	Y	
Do you have effective suppression tools?	Y	
Can you measure the changes in the outcomes from the suppression work?	Y	
Have you identified risks to human health, non-target native species, and the environment? Are these risks acceptable or can they be avoided, minimised, or mitigated?	Y	
Do you have the support of the community and key stakeholders despite identified risks?	Y	
Will you be able to secure all required consents including landowner permission to access the site?	Y	Main permission still to come but no problem anticipated.
Can you secure the necessary resources (such as people, funding, and equipment)?	?	Funding sources yet to be identified. Project staff resources look ok but no commitments have been made yet.
Can you keep the project going long-term to retain the gains that have been made?	?	Currently no funding committed beyond feasibility phase. Project requires a ten-year commitment of resources.

### 7.1 Independent peer review

#### Independent assessment comments

<b>Assessor:</b> Erin Mansniquie	<b>Date of assessment:</b> 31 November 2023
<b>Comments</b> <ul style="list-style-type: none"> <li>Good clear goals and identification of what is required to reach them.</li> <li>Not sure of costings - it looks like not enough is allowed for paying fieldworkers.</li> <li>No contingency costing allowed for if the scale of the project needs to expand.</li> <li>Are there pigs in this forest? If so, this could influence methods, outcomes, and feasibility.</li> </ul>	

### 7.2 Secure long-term funding

The project needs a ten-year commitment to funding to make it viable to begin. Beyond this period, the monitoring information, the relationships established and maintained, well documented project reviews, and the track record of the project should enable further funding commitments to sustain the project further.



# Join the Fight

Protect our islands from invasive species

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Mogetin

Rahn Anim

Iokwe

Alii

Kaselehlie Len Wo

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Mālō te ma'uli

Halo

Tālofa nī

Halo

Tālofa

Halo

Tālofa

Ni sa Bula Fakaalofa lahi atu

Bonjour

Mālō e lelei

Kia Orana

Ia Orana  
Bonjour

Hello

Kia Ora

