



Pacific Invasive Species Battler Series

INVASIVE ANIMAL SUPPRESSION SUPPLEMENTARY RESOURCE • FICTITIOUS WORKED EXAMPLE

OPERATIONAL PLAN TO SUPPRESS RATS AND CATS FROM MANGAPIKO ISLAND, 2025–2030



Department of
Conservation
Te Papa Atawhai



SPREP
Secretariat of the Pacific Regional
Environment Programme



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Te Papa Atawhai (DOC), 2024

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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 Operational Plan was created to show how the template for an operational plan 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*.

Author: Amataga Apa		Date: 25 July 2024
Version	Reason for change	Date
1	Draft for review	10 June 2024
2	Peer reviewed final	25 July 2024

Introduction

This ten-year plan is to seasonally suppress rats and cats 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% of chicks to survive. The project must be sustained for at least ten years at an annual cost of about \$150,00 per year to make a difference to the adult bird population.

A **Feasibility Assessment Report** in 2023 found the project technically achievable with good support from stakeholders and local residents of Pangatu. 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.

1. Project goals, treatment site, and scope

1.1 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 they once occurred.

1.2 A description of the problem

Over the last 60 years, the manulavalava population has declined and is no longer found on 80% of the islands it was once known to breed on. The Mangapiko Island population is the largest remaining at 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 transition usually occurs in March at Pangatu.

Ship rats invaded the island only in the last ten years and are found throughout the island in high numbers. They attack manulavalava eggs and young chicks in the burrows. Consequently, the breeding success at Pangatu is less than 2% under the combined attack by rats and cats. Without intervention to suppress this predation, the manulavalava will be lost from Mangapiko Island, likely forever because there are so few places left in the South Pacific where they can breed safely.

1.3 Project goals

Goal area	Result target SMART goal	Outcome target SMART goal
Manulavalava petrel protection 2024–2034	Ship rat abundance is suppressed to less than 5% tracking tunnel index within the Pangatu breeding area by 1 December each year and maintained below 8% 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 to 2034.	Manulavalava petrels successfully fledge 75% of chicks hatched each season from 2024 to 2034.

1.4 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 many foot tracks throughout the area. The forest near Mt Tupou is dense but 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.

Rat suppression will be set up and maintained around the core area of manulavalava breeding, about 150 ha surrounding Mt Tupou. Cat suppression will cover a much wider area of 500 hectares. The boundaries of the suppression areas will be revised as the project progresses.

1.5 Scope

Within scope for this project is:

- periodic suppression of both rat and cat populations annually
- result monitoring for rat suppression
- data collection from bait use and cat trap captures
- assistance with field data collection of manulavalava petrel outcome monitoring.

Outside the scope for this project is:

- 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 and therefore will be led by Birdlife International experts. However, the monitoring fieldwork will involve project staff under the guidance of Birdlife International.

2. Project team and structure

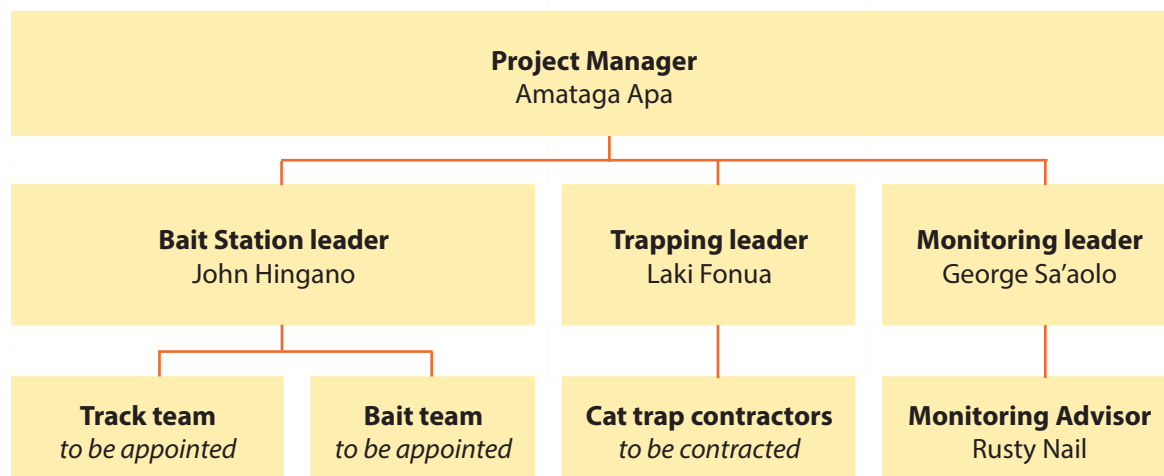


FIGURE 1. Project structure.

Position / Role	Name	Responsibilities
Project manager	Amataga Apa	- Oversee running of project and safety of project staff - Manage project finances - Arrange contracts and employment agreements - Communicate with stakeholders - Conduct annual reporting and project review
Bait station Leader	John Hingano	- Supervise bait station team - Train bait station team - Collect field data on bait use - Contribute to annual report
Cat trapping leader	Laki Fonua	- Supervise cat trapping team - Supervise cat trap establishment contract - Manage safety of cat team - Collect field data on cat captures - Contribute to annual report
Monitoring leader	George Sa'aolo	- Supervise monitoring team - Manage safety of monitoring team - Contribute to annual report
Monitoring advisor	Rusty Nail	- Train monitoring team - Manage quality of data collection - Analyse field data - Contribute to annual report

3. Communication

The communication plan will be updated throughout the lifespan of the project with information on who has been talked to, discussion outcomes, and consultation planned.

Community/ Agency/ Stakeholder/ Sponsor	Contact person	Contact details	Project interest	Consultation outcomes
Forestry Commission	George Lucas	Glucas@forestry.gov	Administer the Pangatu forest.	Consent provided for project to happen on Commission forest land.
Pangatu Village Council	Pa Whenua	Big House, Pangatu Village	Known as the guardians of Pangatu forest, this Council shares the goals of manulavalava protection. Want to see rat suppression extend into gardens and expand time frames to offer longer seasonal protection from rats.	Every family in Pangatu Village has had at least one conversation with the Project Manager about the project. Individual concerns are noted in a project diary. Further outreach into the local school is planned for July. Project newsletter is provided to all stakeholders and on the church noticeboard every two months.
Birdlife International	Steve Cranwell	Steve@birdlife.org	Committed to supporting the project and willing to provide skilled ornithologists for monitoring outcomes.	Rusty Nail and Big Stevie have become involved in the project bird monitoring.
PRISMSS	Dave Moverly	Dmoverly@SPREP.org	Committed to supporting the project and willing to provide ongoing technical support.	Min Fa'avu has become the PRISMSS contact and will arrange review of this plan.
Mangapiko Local Government	Matiu Potata	Matt@mangapiko.gov	Understands and supports the goals of the project. Sees opportunities for local employment on the project.	Kept him updated on development of outreach plan and "Kids for Manu" school programme. Matt is providing valuable assistance in developing a fair system of buying local goods and services.

4. Suppression design

Rats and cats impact on the manulavalava population at all lifecycle stages, and the birds are vulnerable to each at different stages (refer to Figure 2). The points of vulnerability and predation dictate the timing of our suppression work.

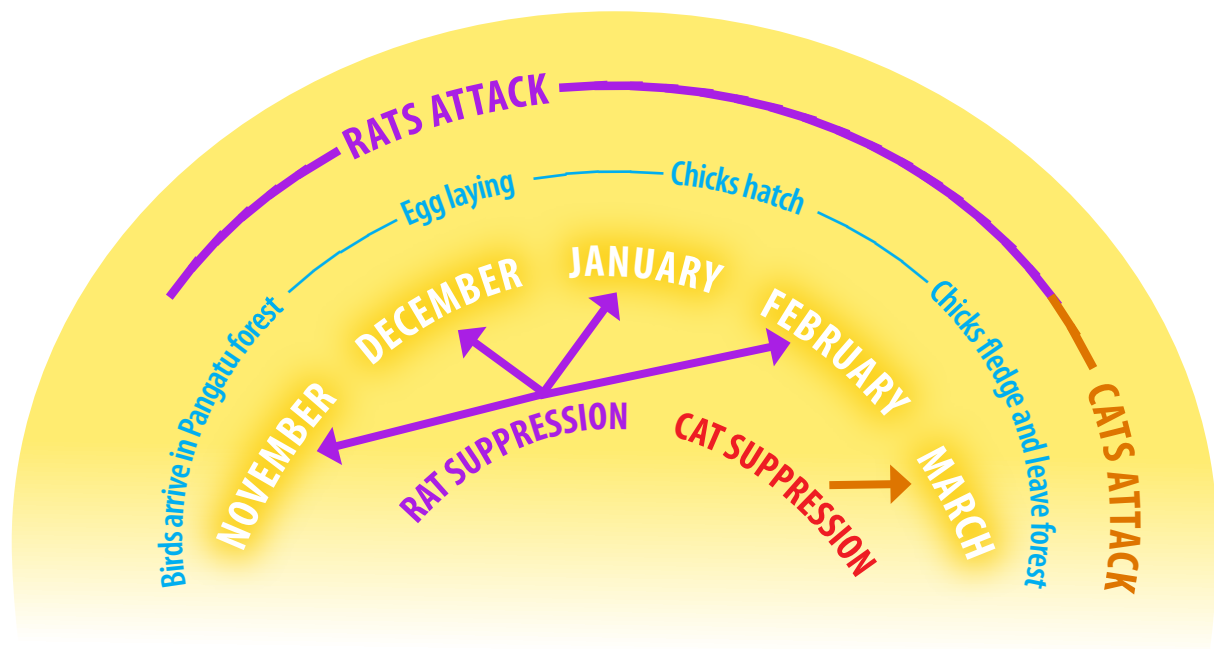


FIGURE 2: Impact of rats and cats on the manulavalava population against seasonal breeding and migration.

4.1 Suppression of rats

Timing

We know that the rat population will rebound, increasing to starting levels within months of any suppression effort stopping. Our annual cycle of rat suppression will start in November, so rat populations are lowered to target levels before manulavalava breeding begins in December. Pulses of poisoning will be repeated in January and February to keep rat levels down. By March, there will be no more eggs, and the chicks should be big enough to defend themselves against rats.

Treatment area

The area covered by the rat suppression will be revised every four years when information from the bird burrow mapping becomes available. In the first season, the rat suppression area will focus on Mt Tupou and extend west towards the Pangatu gardens – a total of 150 hectares.

Tools and layout

We will suppress rats using poison baits in a network of 'Pestoff dead rat café' bait stations throughout the forest to make poison baits available in every rat territory.

Each device will be numbered and located by GPS so it can be mapped to help with record keeping.

The bait stations will be every 50 metres along transects 100 metres apart. In total, this means 300 bait stations (10 transects of 30 stations each).

Each station will be marked with a number using a permanent garden marker pen so the location of each station can be mapped.

Each station will be filled initially with 600 grams of Ratoff Rodent Bait pellets containing 50 ppm diphacinone.

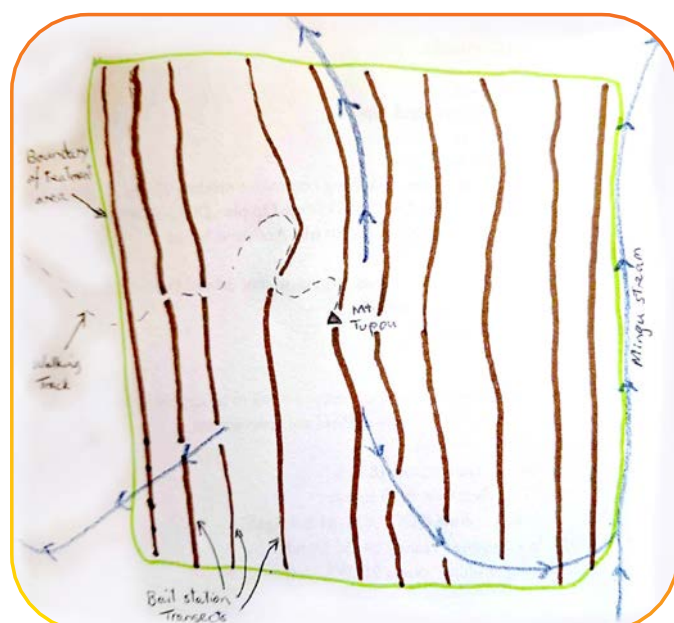
The first fill will begin on 1 December and be completed by 16 December. Stations will be refilled again in January and February.

Quantities will be 300 grams for the January fill and 250 grams in February although new information may cause these figures to be adjusted. A total quantity of 405 kilograms (kg) of bait will be ordered (see table below).



FIGURE 3. Pestoff dead rat café.

Date	Bait quantity per station	Total bait for 300 stations	
December	600 grams	$600 \times 300 = 180,000$ grams	$180,000/1000 = 180$ kilograms
January	300 grams	$300 \times 300 = 90,000$ grams	$90,000/1000 = 90$ kilograms
February	250 grams	$250 \times 300 = 75,000$ grams	$75,000/1000 = 75$ kilograms
Total estimated for 3 fills		$180 + 90 + 75 = 345$ kilograms	
Spare bait	200 grams per station	$200 \times 300 = 60$ kilograms	
Total bait required by project		$345 + 60 = 405$ kilograms	



All bait will be removed from stations at the end of March. Quantities of bait remaining at the time of removal will be recorded for each numbered station so the amount of bait taken can be mapped.

FIGURE 4. Map showing bait station transects for rat suppression.

4.2 Suppression of cats

Timing

Cat suppression will be done in March, to correspond with bird hatching season.

Treatment area and method

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).

Tools and layout

SA2 kill traps will be used. Spacing intervals of traps will be every 250 metres on transects 500 metres apart requiring a total of about 20 traps.

The exact location of traps will need to take account of cat behaviour, the terrain, and habitat features which require experienced cat trappers to set up. Traps will be all set by 10 March and lured with 50 grams of fish paste. Each trap will be checked and re-lured on average every 7 days until the end of March.



FIGURE 5. SA2 cat trap.

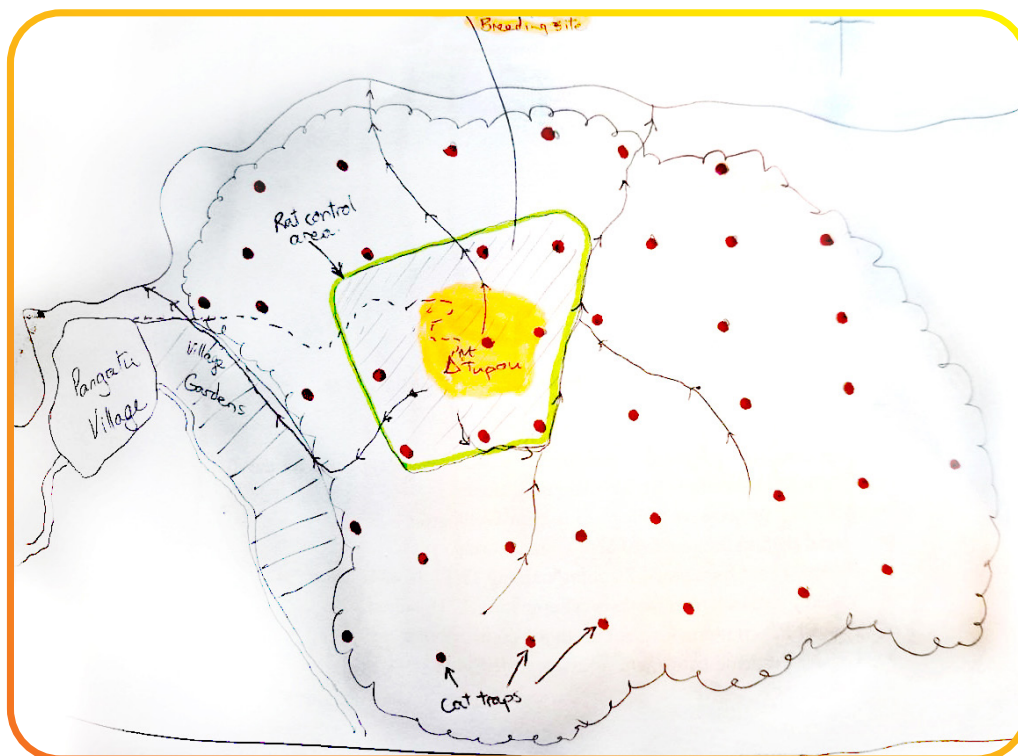


FIGURE 6. Map showing approximate locations of cat traps (red dots).

5. Result monitoring

5.1 Monitoring for rats

Five randomly located tracking tunnel transects each containing 10 tunnels spaced 20 metres apart will be established in October as per the map above. Inked tracking cards will be placed inside these and each end of the tunnel baited with a 'pinch' of peanut butter for a single night (that is, collected the next day) on or before 3 November and again at the end of March. The proportion of cards with rat footprints will indicate the rat population level.



FIGURE 7. Footprint tracking card showing rat footprints.

5.2 Monitoring for cats

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). Cat captures will be recorded in a notebook, noting the date, trap number, and sex of cat.

The more effective monitoring of success in cat suppression will be the outcome monitoring of manulavalava fledging success.

6. Managing risks and health and safety

6.1 Managing risk to the public and non-target animals

Risk	Likelihood	Consequence	Measures to manage risk
Adults and school-age children being poisoned by rat bait.	Low. Unlikely that people will eat green-coloured bait from a station.	Moderate. Poison is slow-acting, allowing time for medical attention; humans are not vulnerable to small quantities.	- Warning signs placed at the entrance to forest. - Visits and talks with Pangatu school. - Discussion of this risk with Pangatu residents including 'what to do' leaflet left with each household. - Notification of local doctor.
Children wounded by cat traps.	Moderate. Children sometimes play in the forest and may encounter traps.	Moderate to high. Traps are powerful enough to break fingers if caught.	- Warning signs placed at the entrance to forest. - Visits and talks with Pangatu school. - Discussion of this risk with Pangatu parents and older siblings including 'what to do' leaflet left with each household.
Young children poisoned by rat bait.	Low. Unlikely that young children will enter forest unaccompanied. Accessing bait from bait stations is difficult for young children.	High. Small children are more vulnerable due to low body weight.	- Discussion of this risk with Pangatu parents and older siblings including 'what to do' leaflet left with each household. - Notification of local doctor. - Bait tastes bad to kids.
Village chickens poisoned by rat bait.	Low. Closest bait station will be 2 kilometres from Pangatu village.	High. Poison could kill chickens.	- Bait stations will make it difficult for chickens to access bait. - Discussions with Pangatu residents of this risk and the need to prevent chickens entering the forest.
Village dogs poisoned by rat bait.	Moderate. Some dogs roam freely in the forest.	High. Dogs could be killed by poison.	Discussions with Pangatu residents of this risk and the need to prevent dogs entering the forest.

6.2 Managing the health and safety of the team

A health and safety plan has been developed for the field team ([link](#)), and every team member must read it before starting field work.

7. Task list, task assigning, and timeline

Target date	Task	Assigned to	Dependencies	Task specifications	Completed
30 July	Gain permission to work on site	Amataga Apa	Forestry commission approval of plan		
1 Aug – ongoing	Hold discussions with Pangatu residents	Amataga Apa			
5 Aug	Order bait and equipment	Amataga Apa	Project finances available		
30 Aug	Select project team	Amataga Apa			
30 Aug	Finalise cat trapper contract	Laki Fonua			
1 Sept	Train team members	John Hingano	n/a		
2 Sept	Mark access tracks and where traps and bait stations will be placed	John Hingano			
13 Sept	Cut access tracks	John Hingano	Fine weather window		
13 Oct	Install bait stations and traps	Laki Fonua	Trap installation requires contract trappers	Link Task Spec	
15 Nov	Install rat tracking tunnels	George Sa'aolo		Link Task Spec	
30 Nov	Install and maintain warning signs	Laki Fonua			
1 Dec	Conduct rat monitoring	George Sa'aolo			
10 Dec	First bait fill in stations	John Hingano			
15 Jan	Second bait fill	John Hingano			
15 Feb	Third bait fill	John Hingano			
16 Feb	Set cat traps	Laki Fonua			
1–31 Mar	Conduct bird monitoring	Steve Cranwell			
30 Mar	Remove all leftover bait from stations	John Hingano			
31 Mar	Conduct rat monitoring	George Sa'aolo			
1 April	Conduct project debrief	Amataga Apa			
30 April	Publish annual report on project	Amataga Apa			

7.1 Task specifications for complex tasks

Task specifications are linked in the table above and will be worked through at the September staff training.

7.2 Equipment, storage, and transport

All tools and equipment will be stored in a locked shed in Pangatu Village.

Tools and equipment	Quantity	Source	Cost	Totals
Track cutting machetes	15	Mangapiko Traders Ltd	15 x \$35 each	\$525
Files for sharpening	6	Mangapiko Traders Ltd	6 x 4.50 each	\$27
Safety boots for track cutters	15	Mangapiko Traders Ltd	15 x 75 each	\$1,125
Disposable gloves for handling bait	3 boxes	Mangapiko Traders Ltd	3 x 15 each	\$45
Hammers	12	Mangapiko Traders Ltd	12 x 35 each	\$420
Back packs for bait	15	Mangapiko Traders Ltd	15 x 80 each	\$1,200
SA 2 Cat traps	50	Imported from Vito Traps Inc	50 x 95 each	\$4,750
Dead Rat café bait stations	300	Imported from Orillion NZ	300 x 25 each	\$7,500
Garden marker pens for numbering bait stations	1 box of 25	Mangapiko Traders Ltd	1 x \$20 box	\$20
Black Trakka monitoring tunnels	50	Imported from Vito Traps Inc	50 x 16	\$800
Black Trakka monitoring cards	150	Imported from Vito Traps Inc	150 x 2.25 each	\$338
Trail cameras	20	Imported from Ecco Supplies	20 x 170 each	\$3,400
			Sub-total	\$20,150
Annual Supplies				
Ratoff rat bait pellets	405 kg	Imported from Orillion NZ	405 x \$20 per kg	\$8,100
Staples for securing cat traps	1 box of 1,000	Mangapiko Traders Ltd	1 x 95 per box	\$95
Small cans of fish paste	1 carton of 1,000	Mangapiko Traders Ltd	1 x 250 per carton	250
			Sub-total per year	\$8,445
			Total year one	\$28,595

7.3 Signage

Signs will be in English and Farsi as shown in Figure 8, except the chemical name will change to diphacinone.



FIGURE 8. Example of warning sign to be used.



FIGURE 9. A map of warning sign locations (yellow squares).

7.4 Budget

All values here are presented in NZD (\$).

Set-up costs

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

Tools and equipment Year 1 \$20,150 (see 7.2 above for detail)

Contingency for unexpected costs 10% of total \$40,150 x 0.1 = \$4,015

Total set-up cost: \$44,165

Ongoing costs

12 fieldworkers x 160 days per year x \$280 per day = \$44,800

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

Bait and trap supplies \$8,445 per year (see 7.2 above for detail)

Accommodation and storage rental \$5000 per year

Contingency for unexpected costs at 10% of total \$130,245 x 0.1 = \$13,025

Total ongoing cost: \$143,270

Total Year 1 cost \$44,165 + 143,270 = \$187,435

Inflation adjustment at 2.5% of total for year 3 to 10:

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
187,435	143,270	146,852	\$150,523	154,286	158,143	162,097	166,150	170,304	174,561

7.5 Data recording

Bait use, bait take, and cat captures will be recorded following the advice and field sheets provided by the monitoring advisor. The advisor will also assist with quality control of data and analysis.

8. Operational plan review

Name of reviewer:	Big Stevie
Date of review:	15 March 2024
Comments Contingency costings and resourcing does not cover the risk of a need to expand the scale of suppression work identified in the feasibility assessment. Should this risk eventuate, the project will need substantial re-working and re-costing which should be evaluated in a new feasibility assessment.	





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Aloha

Mogetin

Rahn Anim

Iokwe

Alii

Kaselehlie Len Wo

Mauri

Ekawomir Omo

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

