OPERATIONAL PLAN

Title: *Poor Knights Islands invasive plant management programme*

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Version History:

VERSION	DATE	AUTHOR	REASON FOR CHANGE
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EXECUTIVE SUMMARY

This Operational plan has been completed by the New Zealand Department of Conservation with support and advice from the Pacific Invasives Initiative. The plan has been designed to guide implementation of invasive plant pests (weeds) on the Poor Knights islands(PKI) and describes how to proceed with such an operation in the most efficient and effective way.

Invasive plant management on PKI is technically and socially feasible. It is clearly evident from numerous invasive plant management programmes that removal of invasive plants from small (<1000ha) isolated islands such as PKI is highly achievable. The issue however is how best to go about doing so and what level of control or eradication of the weed species present is required for native regeneration.

Invasive plant management has previously occurred on the islands but in a sporadic and *ad hoc* effort. The local community on the mainland adjoining PKI, strongly support the total removal of the weeds on PKI in perpetuity. The local Iwi also wish to see their islands protected from invasive plant threats.

The Operational plan describes how weed control can be achieved under several stages. It further shows what monitoring is required to demonstrate success, learning's and failures. Lastly it highlights the Biosecurity considerations necessary to ensure the islands are not put at further risk of incursions from the invasive plant management programme.

There are a numbers of risks and challenges that largely revolve around resource availability (skilled labour, island travel logistics, quarantine, staff time, finances), and timeframe planning for completion, particularly surrounding the life duration of the project and timing of treatment. These however can and will be managed as explained further in the document.

1. INTRODUCTION

This Operational Plan has been prepared for the Department of Conservation as an internal document for outlining project implementation, but it is available for all interested parties.

The Department of Conservation is the administering body for the Poor Knights Island's Nature Reserve and is responsible for implementing such weed control projects. This project is part of a wider offshore island weed programme encompassing other island nature reserves.

The purpose of this document is to outline and guide the work involved in managing weeds on the Poor Knights; what technique is most suited for the eradication or control of weeds and how to proceed.

2. GOAL, OBJECTIVES and OUTCOMES

2.1 Goal

The goal of the proposed project is to ensure the natural processes and ecosystem integrity of the Poor Knights Islands are functioning in a healthy state and secure from invasive plant impacts.

Achieving this goal is important because the PKI has national importance as a significant biodiversity hotspot with numerous threatened plant/animal species and species that are exclusively endemic to the islands. The islands are also home to vulnerable and nationally under-represented forest types

2.2 Objectives and Outcomes

The invasive plant species present on the islands and their wide extent of distribution determine that a site-led approach to the invasive plant issues is the best approach. The potential for reinvasion combined with, seed bank viability, extent and age of infestations determine the target level of control between eradication and containment at opposite ends of the management spectrum.

It is believed some invasive plants species can feasibly be eradicated due to unlikely reinvasion, while others can at best be controlled to zero density over differing time scales due to either bird or wind borne reinvasion of seed.

Table 1: The objectives that this project will work towards and the outcomes that will be seen as a result of achieving these objectives:

Objectives	Outcomes
1. Eradicate all human-dispersed invasive plant species within 5years	The natural native vegetation colonisation and successional processes which invasive plants otherwise disrupt are maintained
	The unique plant and animal species populations are protected and enhanced by preventing loss of habitat through invasive plant competition.
	The rare and vulnerable coastal forest types remain intact and protected from displacement and transformation by invasive plants.

2. Control to Zero-density bird-dispersed invasive plant species within 10years	As above
	As above
	As above
3. Control to Zero-density wind-dispersed invasive plant species within 20years	As above

3. THE SITE AND TARGET SPECIES

(see Feasibility Study Report for more detailed information)

3.1 The Site

The Poor Knights Islands comprise a total area of approximately 272ha. The island group consists of 7 islands and islets - 2 large fully vegetated islands, the rest smaller partially vegetated islands. The islets and coastal edges of Tawhiti Rahi and Aorangi are steep cliffs and broken terrain. Tawhiti Rahi and Aorangi rise to flat plateaus with highest points approx 200m above sea level. Access onto the islands is via difficult boat landings onto rock ledges in calm conditions or via helicopter.

Iwi have *mana whenua* over the Poor Knights Islands. The islands are therefore extremely *tapu* and sacred sites to Iwi with extensive layers of archaeological sites.

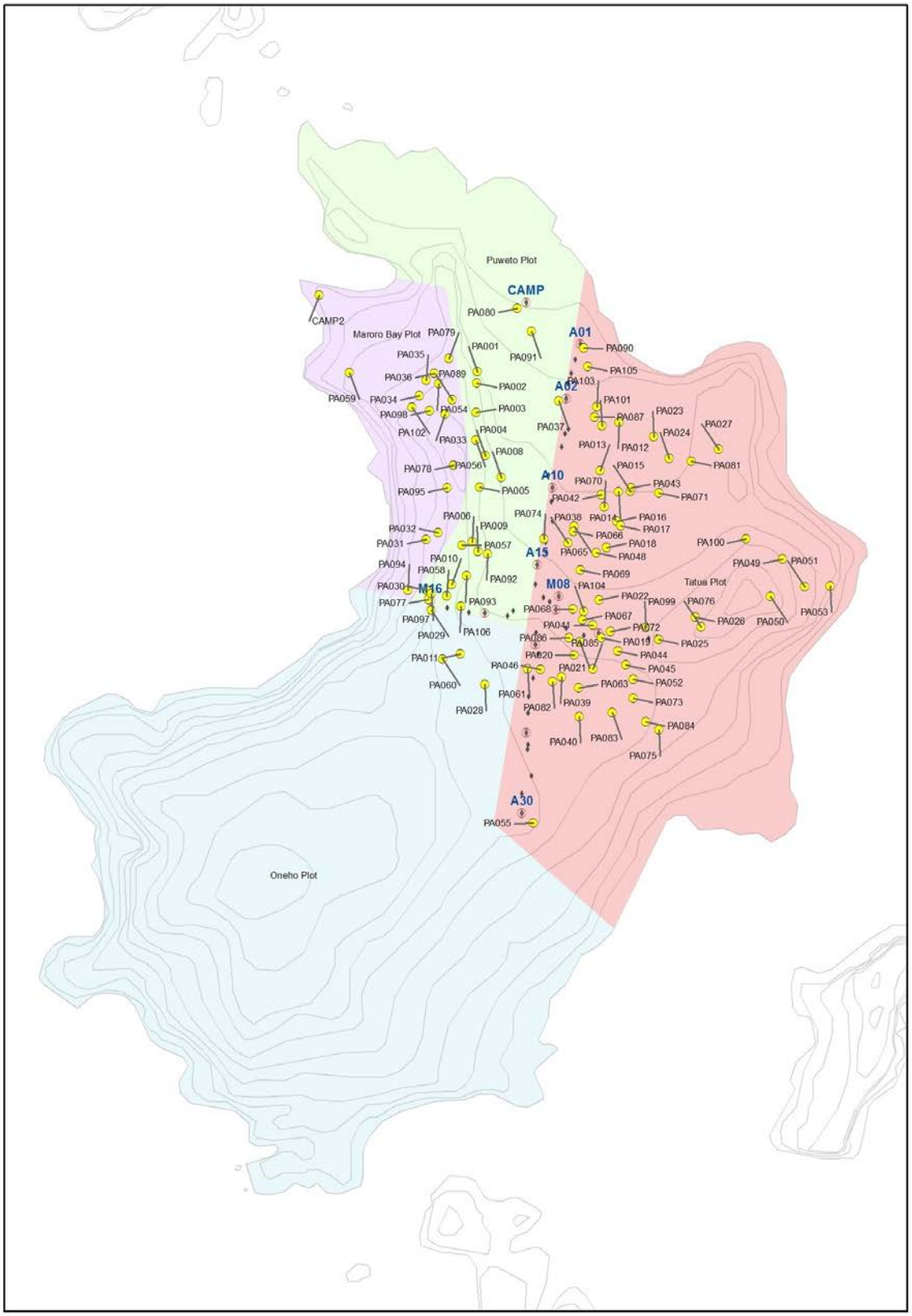
The only mammalian pests to have inhabited the islands were pigs which Captain Cook introduced to Aorangi Island only. These were eradicated in the 1930s.

Diving charter operators are frequently in the waters exploring the world class diving, but landing on the islands is by Nature Reserve Landing Permits and only after consultation between the Department of Conservation and Iwi. Approvals are only given where the purpose of the visit has a cultural, scientific or biodiversity benefit.

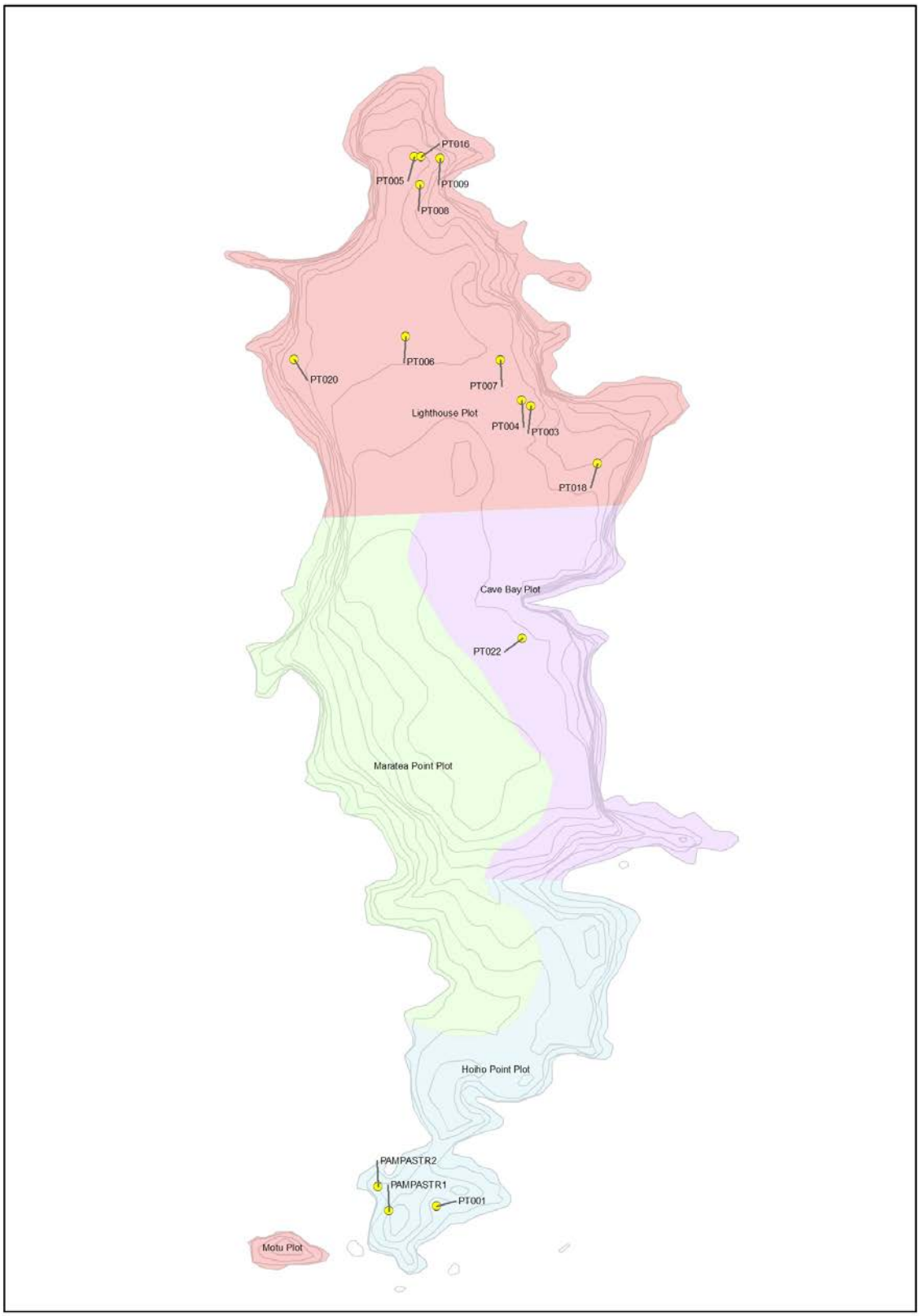
Table 2: Summary of site Information

Site Unique ID	PKI
Site name	Poor Knights Islands Nature Reserve
Easting	NZTM E 175 7639
Northing	NZTM N 607 4772
Municipality	Whangarei District
Village	N/A
Community	Tutukaka Coast
Landowner	Public Conservation Land- Nature Reserve
Search radius (m)	N/A entire island 272ha
Notes	See database for more information on site details

Map 1: The Poor Knights Island group



Map 2: Aorangi Island - Poor Knights Islands. Showing weed locations and stratification of site into weeding plots.



Map 3: Tawhiti Rahi - Poor Knights Island. Showing weed locations and stratification of site into weeding plots.

3.2 The Target Species

Four invasive plant species are currently present on the Poor Knights Islands. These being Mexican devil *(Ageratina adenophora)* Mistflower *(Ageratina riparia),* Mothplant *(Araujia hortorum/sericifera)* and pampas grass *(Cortaderia selloana and C. jubata).*

All four of these species are primarily wind dispersed and it is suspected the invasive plants found their own way to the islands originally. They have managed to reach the Poor Knights at a distance of 16km offshore.

There is potential for other species to also arrive in future from the mainland of New Zealand with many invasive plant species prevalent along the Northland coast.

4. OPERATION DETAILS

Methods:

The least harmful treatment is hand-weeding and it is the preferred and most cost-effective technique on the Poor Knights. Plants are manually uprooted and dirt shaken. The plant is left hanging upside down in a shaded part of the weed site. Mothplant roots are brittle and care has to be taken to extract the full root system as a break-off will re-sprout.

The core weed plots on the island are sweep-searched with the team in a line at eye-sight spacing. The team comes together at each site when one of the team members encounters the site markers. A thorough search-and-destroy for weeds is conducted out to the maximum edges of the known site boundary. The supervisor decides when the site has been thoroughly searched before moving on.

New sites are GPS'd and the centre of the site has a permanent purple triangle attached with its unique identifier number. Site boundaries are marked with pink flagging tape and the identifier number written on them. Pockets of weeds found within a site, particularly with mature seed are marked with pink flagging and details written on it to assist consecutive teams in concentrated search effort at hotspots for seedling germination.

In all small sites or when re-visiting sites any flowers found are collected and bagged to prevent further seed fall. In large sites under initial treatment the seed is left on the plant due to the risk of spread and logistics and time that would be lost collecting seeds.

The heaviest workload falls in September, prior to flowering, and January, prior to fruiting and seeding.

Data for Project monitoring (e.g. keeping to budget) and Operational monitoring (e.g. time/treatment) will be collected as part of the Operation. Outcome monitoring is covered in the Monitoring Plan attached to this document.

Table 3: Seasonality of work load (more detail is in project database)

SEASON	Winter		Spring			Summer				Autumn		Winter
CALENDAR YEAR	J	A	S	O	N	D	J	F	M	A	M	J
Programme Manager	8	8	8	8	8	8	8	8	8	8	8	8
Ranger		16	24	16	16	16	24	16	16	24		
Weedteam supervisor		24	160	24		16	160	24				
3 x Weedteam members 160hrs each			480				480					
TOTAL HOURS/ MONTH	**8**	**40**	**656**	**40**	**8**	**32**	**656**	**40**	**8**	**8**	**0**	**0**

NOTE: hours for 2 volunteer Weed team members are not included in total (160hrs each)

5. NON-TARGET SPECIES

Non-target species will see a positive gain achieved although it is likely some individuals of non-target species populations will die due to the management operation. This could be via trampling or uprooting during handweeding, but as the plant, insect and lizard populations of these islands are very healthy, the risk to the species at the population level is non-existent.

While some individuals may die, in the long term the population is safe both through habitat being enhanced and maintained and recruitment rates exceeding mortality rates. Hand-weeding techniques used greatly reduce mortalities during treatment compared with using other techniques such as herbicide application.

Staff will be trained in plant identification so that, in sites where habitat for rare and endangered species is present (such as scurvy grass, rorripa, asplenium, etc.) extra care is taken not to remove these species if they are present. Removal of weeds will give more opportunity for germination and population increase in rare plant species.

6. ENVIRONMENTAL EFFECTS

Nett effects on the environment will also see a positive gain. Due to this project involving hand removal of weeds there are no environmental pollutants to consider. Sound Quarantine procedures will ensure the visitation does not introduce unwanted organisms. Hygiene protocols for leaving sites and travelling around the island from weed-free to weed-dirty areas will ensure existing weeds and seeds are not spread during inter-site travel

As the islands are home to many ground burrowing and nesting seabirds visitation of any form can cause damage to burrows and interruption of breeding. The healthy size of the populations

and infrequency of work would deem such burrow damage and interruption inconsequential. However, to reduce the impacts, the timing of trips is designed to avoid when the majority of birds are breeding.

Training and visitation protocols also ensure staff are familiar with avoiding burrowed areas whenever possible and, where not possible, to utilise proper techniques for crossing burrowed areas with light-feeling footsteps and using tree roots and rocks. Any collapsed burrows that are found occupied or in use are dug out and the roofing fixed.

The presence of Rangers (plus a wider public perception that Rangers may be present) will be a deterrent to illegal landings, and provide opportunity to catch illegal landings happening. Ranger presence will provide the opportunity for passive and active surveillance for other biosecurity incursions and anecdotal monitoring of threatened species populations to pre-empt any issues that may appear with their population security.

7. ENSURING THE SAFETY OF PEOPLE

Key safety considerations revolve around the following activities and worker exposures:

1. **Boating and shore landing operations**
   Minimised by proper training, use of suitable protective equipment and experienced boat operators
2. **Helicopter operations**
   Minimised by proper training, use of suitable protective equipment and experienced helicopter operators
3. **Abseiling operations**
   Minimised by proper training, use of suitable protective equipment and experienced abseilers
4. **Environmental weather conditions.**
   Minimised by proper training, use of suitable protective equipment and avoiding working in severe conditions.
5. **Hygiene at camp and zoonoses from wildlife**
   Minimised by regular cleaning, use of suitable protective equipment and sterilisers and isolating individuals who may get sick.
6. **Topographical conditions**
   Minimised by suitable training, use of suitable protective equipment, orienteering skills avoiding dangerous sites.

First aid kits to be carried at all times

Emergency evacuation procedures well understood by all in the field party.

8. LOGISTICS

Pre-trip preparations
The operational team shall arrange supplies and provisions 2 days before departing with fresh food purchased and equipment packed in readiness, etc. At the end of this preparation day, a full biosecurity check will be conducted and equipment sealed and stored overnight in the quarantine facility.

Getting to the islands
Travel to the site is weather dependent; departing Tutukaka via helicopter or boat charter pickup and transfer from the marina. A 45 minute boat trip or 10 minute helicopter flight is involved to get to the site.

On-site the team will stay at one of the four basic campsites in tents. These are at Tawhiti Rahi lighthouse, Shag Bay, Puweto Valley or Nursery Cove with the choice of which one dependent on where the work is required, type of transport used and weather conditions.

Boat landings can be undertaken at Aorangi, Puweto and Tawhiti, Rocklily Bay in any weather conditions from the Northwest to southwest quarters. To land by boat at these sites in Northerly – Southerly conditions in the Easterly quarter require conditions of less than 1m swell and less than 10kmh winds.

Tahiti Rahi Shag Bay and Maroro Point can be landed in any conditions from the easterly half. Conditions in the Westerly half require less than 1 metre swell and less than 15 km/h winds.

Helicopter landings are only feasible at Tawhiti Rahi lighthouse helipad and Puweto Valley wave platform helipad at the pilot's determination on visibility and wind conditions.

On the islands
Navigation on the island is by general orienteering and bush skills. GPS's are utilised for sweep/grid searching and site and track logging aides location. Marked tracks on the island provide quick access to each work days work location. Wash water is available on site at the campsites from rainwater. Drinking water and food must be taken to the islands as there is no permanent potable water.

Communication
A daily scheduled call at 8.30am on VHF repeater radio or cellphone to the mainland is required. Communication on the island is by yelling, and either simplex VHF radio channels or cellphone if not within voice range.

9. EQUIPMENT LIST

The following list itemises equipment required for 1 field trip. This can be printed and checked-off during equipment preparation pre-departure and de-mobilisation post return.

Table 4: Equipment List

Equipment	Qty	Source	Responsible for sourcing	Done? Y/N	Responsible for packing and maintenance	Done? Y/N
Expedition barrels	10	In store	Project leader		Team leader(maintenance only)	
Chilli- bins	2	In store	Project leader		Team leader(maintenance only)	
Tents	4	In store	Project leader		Crew 1	
Roll mats	4	In store	Project leader		Crew 1	
Camp cooking and mess kit	1	In store	Project leader		Crew 2	
Rubber inflatable landing craft and repair kit	1	In store	Project leader		Crew 2	
Lifejackets	1	In store	Project leader		Crew 2	
20kg LPG gas Bottle	1	In store	Project leader		Crew 3	
20lt water barrels	8	In store	Project leader		Crew 3	
Overfly tarpaulin	1	In store	Project leader		Crew 1	
Gas light	1	In store	Project leader		Crew 2	
GPS	2	In store	Project leader		Team leader	
Camera	1	In store	Project leader		Team leader	
First Aid kit	1	In store	Project leader		Crew 1	
Abseiling set	1	In store	Project leader		Team leader	
VHF radio	2	In store	Project leader		Team leader	
Cellphone	2	In store	Project leader		Team leader	
Personal clothing and equipment (limited to 1 barrel/person).	4	Personal	Personal		Each person	

10. OPERATIONAL TEAM

Table 5: Operational Team

Name	Role	Responsibilities
Monica Valdes	Project Manager	Project planning and oversight. Weedteam selection Budgeting, reporting, analysing database information. Manages field team performance. Trip support logistics.
To be appointed	Weedteam Supervisor	Leading the field team. Weeding. Organising the daily work on the island. Manages the data capture and input into database and team safety.

To be appointed	Weeder 1	2IC when the team splits in two. Weeding sites and all team work needs as requested by team leader
To be appointed	Weeder 2	Weeding sites and all team work needs as requested by team leader or 2IC
To be appointed	Weeder 3	Weeding sites and all team work needs as requested by team leader or 2IC
To be appointed	Weeder 4 Volunteer	Weeding sites and all team work needs as requested by team leader or 2IC
To be appointed	Weeder 5 Volunteer	Weeding sites and all team work needs as requested by team leader or 2IC

11. TASK SCHEDULE

Table 6: Activities for operational, biosecurity and monitoring activities. Key tasks are shaded.

Tasks	Responsible	Completed by	Dependency	Completed
Operational Planning Stage				
Review of Operational Plan, Monitoring Plan and Biosecurity Plan	Whangarei Programme manager and Ranger	June		Yes
Final versions of Operational Plan, Biosecurity Plan and Monitoring Plan	Whangarei Programme manager and Ranger	July		Yes
Recruitment of weed team	Whangarei Programme manager and Ranger Biodiversity	August	Funding	Yes
Implementation Stage: Pre-treatment				
Training: Abseiling Avoiding damage to seabird burrows	Whangarei Ranger Biodiversity	August	-	Yes
Assembling and checking all equipment	Weedteam supervisor	Prior to each departure date (September & January)	-	
Sourcing all food and consumables	Whangarei Ranger Biodiversity	Prior to each departure date (September & January)	Funding	
Biosecurity checks two trips	Whangarei Ranger Biodiversity	Prior to each departure date (September & January)	-	
Trip logistics (including weather forecasting)	Whangarei Ranger Biodiversity	Prior to each departure date (September & January)	Funding	
Project readiness check	Whangarei Ranger Biodiversity	Prior to each departure date (September & January)		
Implementation Stage: Treatment operation				
Setting up camp and camp hygiene	Weedteam supervisor	September January		

Tasks	Responsible	Completed by	Dependency	Completed
Applying treatments and recording monitoring data	Weedteam supervisor	September January		
Implementation Stage: Post-treatment				
Gear clean up and maintenance	Weedteam supervisor	Prior to leaving site on each trip and returning to store.		
Biosecurity	Whangarei Ranger Biodiversity	Prior to leaving site on each trip		
Data entry and Field trip reports	Weed team supervisor	October February		
Operational Review and Annual Report after the two trips	Whangarei Ranger Biodiversity	April		
Sustaining the Project Stage				
Awareness raising of biosecurity risks from illegal landings through boat owners channels	Whangarei Programme Manager	On-going		
Monitoring the project budget	Whangarei Ranger Biodiversity	May		
Budgeting for next year's treatments	Whangarei Programme Manager	June		
Planning for next year's treatments	Whangarei Programme Manager	June		
5 year review	Whangarei Programme Manager	May		
10 year review	Whangarei Programme Manager	May		

12. Appendices

Appendix 1: Consents and Permits

NO CONSENTS REQUIRED

- No Department of Conservation landing permit required due to being Departmental business planned work.
- No consents or permits required from Northland Regional Council for this project due to no herbicide being used

Appendix 2: Monitoring Plan

MONITORING PLAN

Title: *Poor Knights Islands invasive plant management programme*

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INTRODUCTION

The purpose of this monitoring plan is to guide the project team in determining the outcomes of the treatments over time. Due to the current size of infestations and hand removal techniques being utilized, it is quick, easy and feasible to accurately keep tally of individual weeds removed on each trip.

Keeping a record of new sites found will also, over time, show firstly the thoroughness of the control effort in locating all existing sites and then as time progresses the reduction in new sites as the weed population diminishes. This will demonstrate we are effectively killing the weeds and photopoints will show the changes in native vegetation over time.

1. INDICATORS

The indicators for this project will be measured by recording the number of sites treated, the number of individual invasive plants removed and taking photographs at marked points. The Monitoring Plan is summarised in Table ? below.

Number of new sites treated -
Counted by new sites found during treatment each year

Treated areas are recolonized by native plants -
Photopoints

Number of invasive plants removed -
Population census during treatment
Photopoints

2. DATA COLLECTION DETAILS

The information collection methods for measuring each of the indicators are – a datasheet for site and plant data details, a camera for photopoints.

This data will be stored in the site database (PKI-Weeds.xls) to create a measurable trend in weed populations over time. Result Tables, Charting or Graphing the annual statistics will visually demonstrate this. Images from Photopoints will be stored in the PKI folder and compared annually for changes in the vegetation.

Invasive Plant Population Census:
During each site visit (twice yearly for 5 years consecutively) the following information shall be gathered on each weed site encountered (counted by individual weed species):

1. Total weeds removed
2. Total adults removed
3. Total juveniles removed (defined as a plant that has not set and dropped seed – i.e. first year flowers caught and removed before they drop seed will not release more seed into the site)

Annual variations will occur based on the teams' effectiveness (individual's observations and patience with weeding and their observation skills to spot and identify seedlings). These variations in individual ability will balance out over time to create a trend in sites and populations and show if the number of sites is changing, whether the invasive plant population is responding

favourably or not to the treatment and therefore whether the targets of eradication or zero density are being achieved.

Photopoints:
10 photopoints in existing weed sites and 10 photograph points in weed free sites will form the baseline information for comparison over the years of the project.

Photographs taken at the following times -

1. Immediately pre initial treatment.
2. Immediately post initial treatment.
3. 2yrs post initial treatment.
4. 5yrs post initial treatment.
5. 10yrs post initial treatment.
6. 20yrs post initial treatment.

Each Photopoint shall consist of 4 horizontal cardinal point photographs, taken at 1.2m above ground. Days shall be fine and sunny, sun directly overhead (between 11am and 1pm). Each photopoint shall be marked on-site with a permanent marker and GPS'd for accurate mapping and re-location.

A healthy sample size of Photopoints are very good form of evidence at low cost to demonstrate the change in species composition within sites and on the island and hence the outcomes being met. Randomly selected untreated sites will show that outside of the existing weed sites, more new sites are not popping up or are popping up but being dealt with.

Table 1: Summary of Monitoring (NOTE: Indicators for all three objectives are the same)

Outcome	Indicators	Data Collection Method	Baseline Situation	Timing	Responsibility
Objective 1: Eradicate all human-dispersed invasive plant species within 5years **Objective 2:** Control to Zero-density bird-dispersed invasive plant species within 10years **Objective 3:** Control to Zero-density wind-dispersed invasive plant species within 20years					
Outcome 1 The natural native vegetation colonisation and successional processes which invasive plants otherwise disrupt are maintained.	Treated areas are recolonized by native plants	Photopoints	Photopoints	Pre /post initial site treatment, 2,5,10,20 yearly	Project leader
Outcome 2 The unique plant and animal species populations are protected and enhanced by preventing loss of habitat through invasive plant competition.	Number of new sites treated	Population census during treatment	Initial treatment stem count census	Annually	Project leader
Outcome 3 The rare and vulnerable coastal forest types remain intact and protected from transformation by invasive plants.	Number of invasive plants removed	Population census during treatment Photopoints	Initial treatment stem count census Photopoints	Annually Pre/post initial site treatment, 2,5,10,20 yearly	Project leader