

FEASIBILITY STUDY REPORT

Title: *Poor Knights Islands invasive plant management programme*

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EXECUTIVE SUMMARY

This Feasibility Study was undertaken by the New Zealand Department of Conservation (DOC) with support and advice from the Pacific Invasives Initiative (PII). The study was conducted to determine the best way to manage invasive plants (weeds) on the Poor Knights islands (PKI) and how to proceed with such an operation.

The finding of the Feasibility Study is that invasive plant management on PKI is technically and socially feasible and can be achieved under several stages. It is clearly evident from numerous weed 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 invasive plant 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 invasive plants on PKI in perpetuity. Local marine reserve tourism businesses also support. The local Iwi wish to see their islands protected from invasive plant threats.

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

(NOTE: This report has been summarised as a training example from documents and personal experience associated with the Poor Knights Islands management programme. It is accurate, but does not reflect the true complexity of the project.)

1. INTRODUCTION

This report is prepared for the Department of Conservation as an internal document for funding allocations, but it is available for all interested parties.

The Department of Conservation is the administering body for the Poor Knights Islands Nature Reserve and is responsible for implementing such invasive plant management projects. This project is part of a wider offshore island invasive plant programme encompassing other island nature reserves and was selected as a national priority ecosystem.

The purpose of this document is to provide an account of the work needed to be undertaken in determining whether invasive plant removal from PKI is feasible and, to report on the findings of that work in terms of what technique is most suited for the eradication or control of weeds and how to proceed.

Thanks must go to the local Iwi Trust Board, and the Bowden family as local and active enthusiasts in the protection of the Poor Knights.

This report will be used as a guide and founding document for establishing an invasive plant management programme on the Poor Knights.

2. GOAL, OBJECTIVE 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 endemic only 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 control at opposite ends of the management spectrum.

It is believed some invasive plant 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 5 years	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

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.

The island group is located on the North-eastern coastline of northern New Zealand 16km distance from the mainland and 45 minutes by boat from the nearest port of Tutukaka. Access onto the islands is via difficult boat landings onto rock ledges in calm conditions or via helicopter. The islands have a series of rough tracks cut and marked to aide travel on the island. Tawhiti rahi has a camp site in Shag Bay and at the helicopter landing near the lighthouse. Aorangi has a camp site at the base of Puweto valley and a secondary camp on a plateau above nursery cove for when easterly swells prohibit landing at Puweto.

Forested areas are tall canopy up to 15metres high with dense understory. Primarily Pohutukawa (*Metrosideros excelsus*) forest in climax forest areas and mature coastal hardwood forest types in areas recovering from disturbance such as slips, fires or recent history Iwi settlement. Exposed coastal faces are covered in dense coastal scrub up to 2m high or bare exposed rock.

A very high level of local endemism is present on the Poor Knights Islands. *Asplenium pauperequitum*, Poor Knight's lily, Poor Knight's myrsine, Cooks scurvy grass, are a few of the endemic and rare plants present. The islands have an invertebrate population endemic to the site as well with Poor Knight's giant weta, giant cave weta, centipede, flax snail (*Placostylus hongii*) and *Rytida* spp as well as numerous lizards including the northern most population of tuatara that are no longer found on the mainland. The islands are the only breeding place for Bullers shearwater. Fairy prion, Diving petrel, Pycroft petrel, Grey ternlet and blue penguin also breed on the islands.

The island group is surrounded by a permanent marine reserve that extends 800m offshore with strictly no take or interference to any marine life or seabed permitted. This marine reserve has been in place 30 years.

The Iwi have mana whenua over the Poor Knights islands. Iwi vacated permanent settlement on Tawhitit Rahi approximately 400 years ago - before European arrivals. Aorangi was vacated in more recent times in the early 1800s post-European arrivals and after an inter-liwi massacre occurred on the island. The islands are therefore extremely tapu and sacred sites to Iwi with extensive layers of archaeological sites

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

Map 1: The islands of the Poor Knights Group, north east New Zealand



Diving charter operators are frequently in the waters exploring the world class diving.

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.

The invasive plant infestations are predominantly in open disturbed coastal areas, lightwells and second growth coastal forest post-Maori settlement sites. Climax pohutukawa forest is largely free

of invasive plants other than in occasional large lightwells. The main front of infestation is the Puweto Valley on Aorangi which was a site of occupation and was denuded at the turn of the century. A secondary front is at the northern end of Tawhiti Rahi where old gardens existed and a fire had cleared the area 100 years ago. Outlier invasive plant sites are scattered throughout the island group.

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

4. THE TARGET SPECIES, IMPACTS AND BENEFITS OF MANAGEMENT

4.1 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.

Earliest file records show they have been present on the islands since the early 1970s for Mexican devil, late 1970s for Pampas, early 1980s for mistflower and early 1990s for mothplant. (NZ Wildlife Service and DOC files). Birds and humans can also disperse these species in their plumage and on clothing and soil.

In northern NZ temperate sub-tropical climates these four species grow all year round. Drought and frosts destroy young plants, cold temperatures slow their growth and reproductive ability. Mothplant seedlings are fully shade-tolerant while the other 3 species need to be in full sunlight or partial shade.

Mexican devil and mistflower start flowering in early September and will continue to flower through summer until February. Mothplant flowers in Dec/Jan and Pampas in Feb/March. Timing for control is best undertaken during early flowering before seed is set and while the plants are more visible. Re-visit in summer to remove Mexican devil and mist flower seedlings that could flower and set seed before autumn is required as well as to target the flowering pampas and mothplant.

Mothplant and pampas take 2 years to reach maturity. Mistflower and Mexican devil can reach maturity in one growing season - as quickly as 4 months.

The small soft seeds are only viable for 2-3 years in the ground for all species except mothplant which has a harder and robust seed lasting up to 10 years.

The plants are easily killed by hand weeding, manual digging or chemical application. Glyphosate is effective on all plants. Haloxypop is also a grass-only specific herbicide for pampas grass particularly large (2m plus) specimens. Woody plant specific herbicide metsulfuron will kill mothplant, Mexican devil and mistflower effectively where native grasses require protection.

The least harmful option is hand-weeding and it is the preferred and most cost-effective technique on the Poor Knights. Mothplant roots are brittle and care has to be taken to extract the full root system as a break-off will re-sprout.

Other introduced plants have also made it to the islands including inkweed, nightshade, Brazilian fireweed, prairie grass, beggars tick and various grasses. None are considered to be invasive enough to warrant management as they are herbaceous coloniser plants that are quickly displaced by native regeneration.

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.

Table 3: Species information

Common Name	Mexican devil	Mistflower	Mothplant	Pampas grass
TLA*	MEX	MIS	MOT	PAM
Family	Asteraceae	Asteraceae	Asclepiadaceae	Poaceae
Genus	<i>Ageratina</i>	<i>Ageratina</i>	<i>Araujia</i>	<i>Cortaderia</i>
Species	<i>adenophora</i>	<i>riparia</i>	<i>hortorum</i>	<i>selloana</i> and <i>jubata</i>
Synonyms	Crofton weed		<i>A.sericifera</i> , <i>kapok vine</i>	Cutty grass
Habit	Shrub	Erect/sprawling	Vine	Clumping tall grass
WRA score				
Dispersal vectors	Wind, birds, humans	Wind, birds, humans	Wind, birds, humans	Wind, birds, humans
Dispersal distance (m)	>15km	>15km	>15km	>15km
Long Distance Dispersal vectors	Wind, birds, humans	Wind, birds, humans	Wind, birds, humans	Wind, birds, humans
Long Distance Dispersal distance (km)	16	16	>30	16
Time to Maturity (years or months)	4 mths	4 mths	2 yrs	2 yrs
Height at Maturity (m)	3	<1	>6	<4
Seed Viability (years)	2-3	2-3	10	2-3
Number of seeds/square metre	Unknown est 100,000's	Unknown est 100,000's	Unknown est 10,000's	Unknown est 100,000's
Reproduces vegetatively? (Yes or No)	Yes – roots	Yes – roots	Yes – roots	Yes – crown
Natural Inhibitors to growth	Drought, frost, cold, shade	Drought, frost, cold, shade	Drought, frost, cold	Shade
Pollination method	Self-pollinator	Self-pollinator	Self-pollinator	Self-pollinator
Flowering time (months)	Sept to Feb Spring/summer	Sept to Feb Spring/summer	Dec/Jan Summer	Feb/Mar late Summer

Common Name	Mexican devil	Mistflower	Mothplant	Pampas grass
Length of reproductive period	1 month	1month	4months	2months
Origin	South America	Mexico/West Indies	E South America	South America
Management Options	hand weeding, manual digging, glyphosate (before flowering)	hand weeding, manual digging, glyphosate, metsulfuron (before flowering)	hand weeding, manual digging, glyphosate, metsulfuron (before flowering)	hand weeding, manual digging, glyphosate, haloxyfop (before flowering)
Websites or references	NZ Wildlife Service and DOC files	NZ Wildlife Service and DOC files	NZ Wildlife Service and DOC files	NZ Wildlife Service and DOC files

4.2 Impacts

These four species have the potential to disrupt natural plant community successions as they are transformer species. Their vigorous growth rates results in these species dominating lightwells and slips which by prevents native regeneration.

Over time they displace larger and larger areas of natural forest if left unchecked. With loss of habitat the native fauna could also potentially suffer from loss of food supplies and progressive habitat modification into an environemnt they can no longer persist in.

Due to the long-term nature of such impacts one can only speculate this will be the case as no one person or research project has had the lifetime required to study the impacts of such slow habitat change for faunal species from these invasive plants.

4.3 Benefits of management

Removal of invasive plants from the Poor Knights will ensure the biodiversity and ecosystem of the islands is protected.

Maritime visitors to the islands will be able to enjoy the natural beauty of the islands. Researchers will be able to study the flora and fauna of this special site in the absence of invasive pest impacting on them.

5. CAN IT BE DONE?

5.1 Technical approach

Previous control history has been sporadic and not intensive enough to manage the invasive plants and these attempts have led to this proposal being designed. Between 1991 and 1995 occasional treatment of pampas was conducted on the main infestation at Puweto via day visits. This significantly reduced the infestation but failed to target outliers.

In 1993 and 1994 during these day visits it was noted the 4 invasive plants were extensive and increasing. 5-day-long trips were conducted using volunteer help and 30 other sites were encountered. The field trip associated with this feasibility study was for 10 days and discovered triple the number of sites. It was determined that despite the number of sites present they are largely small pockets of invasive plants and are easily manageable.

By undertaking 2 x 10-day visits per year to the islands and hand-weeding the sites found, these plants' life-cycles from germination to producing seed can be beaten. With vigilance over time the existing seed bank will deplete and the lightwells will shade over. As these islands are out on the extreme limits of wind dispersal the potential seed rain shadow is very low which means new incursions will be infrequent and easily addressed before they become a concern and can get re-established.

The logistics of working on remote islands require a high level of trip planning. Weather and access onto the island can be inclement but is not insurmountable. There are areas to land via both helicopters and from boat. Suitable safe campsites exist.

This technique has successfully been used on the Hen and Chickens, Kermadec's and other islands in the Hauraki Gulf such as Hauturu and Rangitoto islands.

5.2 Sustainable

Removing invasive plants from PKI is sustainable in the long term as long as Biosecurity procedures are kept in place and surveillance for new incursions continues. As discussed under the plant and site characteristics, the likely incidence level for reinvasions is minimal. The costs associated with ongoing maintenance are also minimal.

It is envisaged that within 5 years the level of effort required to re-treat sites will be less than half initial costs and thus the maintenance cost insignificant. Within 10 years the cost requirement will be one quarter of the initial control costs in order to undertake surveillance visits annually to check for new incursions.

Table 4: Summary of invasive pathways and other biosecurity issues for the target species

Species	Source	Pathway	Risk	Prevention Strategy
All four invasive plants	Human	Deliberate reintroduction and illegal landings	Very low	Education. Raised awareness of the risk of invasive plants to islands of high ecological importance
All four invasive plants	Human	Failure of biosecurity procedures by legitimate island visitors	Moderate	Education. Raised awareness of the risk of invasive species to islands of high ecological importance. Raised awareness of best practice for visiting special islands. Agencies leading by example. Surveillance and response to incursions.
All four invasive plants	Neighbouring populations on the mainland	Wind/birds	Moderate	The 16km distance offshore means that while high seed rain is unlikely there will inevitably be some in future, particularly if strong westerly flows occur during seed release. Ongoing surveillance and response to incursions will keep this in check.

5.3 Socially acceptable

The wider public are very much interested in seeing our nature reserve protected from threats. There is strong support from the local dive and tourism operators and local communities to see the Poor Knights kept pristine.

Iwi Trust Board are supportive of the aspirations to keep their *taonga* free from introduced pests. Consultation has been undertaken and is ongoing. Iwi will always remain involved in the activities on the Poor Knights Islands.

There are many individuals in the wider community and iwi who wish to volunteer their labour to support such a project and to assist with invasive plant removal.

Table 5: Key stakeholders identified to date

Name	Affiliation	Contact details	Project interest	Notes/comments
TBC	Iwi Trust Board		Iwi mana whenua	Field Trip participants including whanau and advisors
TBC	Northland Regional Council		Support	Field trips and Council support
TBC	Whangarei District Council		Support	Field Trips and Council support
TBC	Coastal Natives Nursery		Support	Field trip participants (including their staff) and designing a strategy.
TBC	Dive, dive, dive!		Support	Field trip Participants including their staff and local business support

5.4 Politically and legally acceptable

There are no political or legal issues likely to affect this project.

The Department of Conservation administer the Poor Knights under the Reserves Act 1977 as a gazetted Nature Reserve. As the managing authority, all activities undertaken are done via the Departments instruments of delegation for approval. All aspects of this project are approved by the local Area Manager.

There are no external permits or approvals required.

5.5 Environmentally acceptable

This project will have a nett positive effect.

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 any 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.

Due to this project involving manual hand removal of invasive plants there are no environmental pollutants associated to consider risk of use.

Sound biosecurity procedures will ensure the visitation does not introduce unwanted organisms. Hygiene protocols for leaving sites and travelling around the island from invasive-plant-free to invasive-plant-dirty areas will ensure existing invasive plants 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 heathy size of the populations and infrequency of work would deem such burrow damage and interruption inconsequential. However to reduce any impacts the trip is timed to avoid when the majority of birds are breeding by coinciding with the shoulder seasons instead.

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

5.6 Capacity

All skills required are locally available. Project planners, managers, GIS specialists are all available within the local Area office. General field workers are required each season to make the core of the field team. There will be no shortage of people available for this field work due to the outstanding opportunity it provides for people to get onto the Poor Knights.

A 4 person team is required for island coverage; ability to split into 2 and general team balance and sharing of duties on site. Training for such a field team is minimal with plant identification, data recording and biosecurity procedures being the basics required.

Specialist field skills such as abseiling are available in house and individual training can be completed as part of the Area Office's wider weeding programmes.

Table 6: Key Skills needed to complete the project

KEY SKILL	PURPOSE	METHOD TO OBTAIN SKILLS
Research	Ensuring smooth and successful implementation of treatment occurs. Don't reinvent the wheel.	In house
Planning	Ensuring smooth and successful implementation of treatment occurs	In house
Report writing	Accurate accounts of what was achieved to demonstrate to stakeholders. Document learning's for benefit of other projects	In house
GIS/GPS	Ensuring thorough island coverage	In house
Boat landings	Access onto islands	In house
Invasive plant identification	Sound biosecurity surveillance and targeting the right plants	In house
Health and safety	Maintaining safe work environment	In house
Data recording	Accurate capture of field data for database and reporting and monitoring	In house
Treatment Techniques	Site marking and thorough treatment coverage	In house

Table 7 Human Resources Skills Register

SKILLS REQUIRED	Role: Project leader	Role: Field team supervisor	Role: Field workers (x3)
Research	✓		
Planning	✓	✓	
Report writing	✓	✓	
GIS/GPS	✓	✓	
Boat landings	✓	✓	✓
Invasive plant identification	✓	✓	✓
Health and safety	✓	✓	✓
Data recording	✓	✓	✓
Treatment techniques	✓	✓	✓
EXPERIENCE (YEARS)	10	3	1
HIGHEST EDUCATION	Tertiary	Tertiary	None required

5.7 Affordability

It is envisaged a high initial cost is required in the first 5 years to get on top of the invasive plant infestations and the major seedbank germination that occurs from site disturbance. All invasive plant programmes are long-term as seeds can be reintroduced easily and seed banks can take a long time to rot in the soil.

Initial set-up costs are not significant in this case as much of the equipment required is already available within the organisation. The bulk of costs are in the labour. Volunteers can also be engaged as part of the field team to reduce this labour component, however it is best to cost in their absence as they cannot be guaranteed.

Table 8: Indicative Costs

Item	Details	Cost (NZ\$)
Project Design Stage		
Project design report	120hrs Labour (for planning, investigation, consultation, etc.)	3,600
Project Design Stage, Expected cost		3,600
Operational Planning Stage:		
Operational plan compilation	120hrs Labour (for planning and consultation, liaison, etc.)	3,600
Operational Planning Stage, Sub-total		3,600
Operational Planning Stage, Contingency (10%)		360
Operational Planning Stage, Expected cost		3,960
Yr 1-5 Annual costs Implementation Stage:		
	Boat Charters x 4 per year	1,500
	Aerial charter and survey	3,000
	Field supervisor and 3 team members (2 x 10-day trips)	12,800
	Field supplies/food	1200
	Field equipment	1000
Implementation Stage, Annual sub-total		19,500
Implementation Stage, Contingency (20%)		3,900

Implementation Stage, Expected annual cost		23,400
Implementation Stage, Expected 5-yr cost		117,000
Yrs 5-10 Sustaining the Project Stage:		
Yr5-10	Boat Charters x 2 per year	1,000
	Field supervisor and 3 team members (2 x 5-day trips)	6,400
	Field supplies/food	600
	Field equipment	500
Sustaining the Project Stage running costs for 5 years (A)		8,500
Sustaining the Project Stage set-up costs (B)		0
Sustaining the Project Stage sub-total(C=A+B)		8,500
Sustaining the Project Stage Contingency (D=20% of C)		1,700
Sustaining the Project Stage, Expected Annual cost		10,200
Sustaining the Project Stage, Expected 5-year cost		51,000
PROJECT TOTAL		175,560

6. CONCLUSION

Removal of invasive plants from the Poor Knights is entirely feasible within 10 years and at relatively low cost. Keeping the islands free of invasive plant impacts in future is also feasible.

It will require a concerted and systematic effort sustained for 10 years to achieve this. It will also require commitment from stakeholders to resource the activity.

The environmental and social benefit of undertaking this project outweighs both the financial costs and the environmental and social losses from doing nothing.

Table 9: Key issues to be resolved before project can proceed

Issue	Recommendation
Maintaining required cash resources	Ensure communication is maintained with stakeholders and reporting and feedback is provided. Sound financial management. Review to demonstrate success after 5 years.
Obtaining field team members	Advertising for positions in DOC gazette, university student associations and newspapers
Maintaining commitment over a long project life-cycle	Ensure communication is maintained with stakeholders and reporting and feedback provided. Review to demonstrate success after 5 years
Timing of visits before flowering period	As access is difficult, a watch on weather patterns will be necessary to look for a window of opportunity for safe landing and departure.
Illegal landings on PKI could compromise biosecurity actions	Awareness raising through boat owners channels, wharves, launching ramps, etc.
Seabird burrows could be damaged by workers	Arrange training to show workers how to move with minimal damage to burrows

7. REFERENCES

Government Internal Files - Series, NHT010, FLO521, R06001, Department of Conservation, New Zealand.

NZ Archives, Government internal File Series NZ Wildlife Service and NZ Lands and Survey

PIER Website: <http://www.hear.org/pier/index.html>

Owen, S. J. 1997. Ecological weeds on conservation land in New Zealand: A database. Working draft. Wellington, New Zealand. Department of Conservation.

Worked Example

8. APPENDICES

Appendix 1 Site Visits

POOR KNIGHTS ISLANDS NATURE RESERVE

WEED SURVEY AND CONTROL REPORT - September 2002

Tawhiti Rahi and Aorangi Islands - 7th September to 13th September 2002

Prepared by Glen Coulston

Introduction

A five day expedition to the Poor Knights spending 1 day on Tawhiti Rahi Island and 4 days Aorangi Island, for the purpose of weed survey and control. This was one of the twice yearly trips as outlined in the Weed Eradication Strategy and Operational Plan Poor Knights Islands (WESPKI) (Bowden and Bowden, 1996).

Objectives

The expedition had the following objectives

1. Search and destroy target weed species in known sites on both islands, [Mothplant (*Araujia sericifera*), Mexican Devil (*Ageratina adenophora*), Mistflower (*A. riparia*), Pampas grasses (*Cortaderia* spp.), and Ragwort (*Senecio jacobaea*)]
2. Complete an aerial survey of the islands for potential mothplant in the canopy of the forest.
3. Record number of target weeds encountered and treatment received.
4. Describe or verify location of all weed sites accurately and replace existing perished tags.
5. Update the island database.
6. Make recommendations for future management.

Dates, personnel, and travel.

Total expedition 26th August to 29th August 2002.

Team comprised of Glen Coulston (Team Leader), Phil Taylor, Melanie Thomas, Kuhblai Dyas-Callenson and John Lolesi. Travel to and from the Poor Knights was via Kenny Anderson (*Noble Princess*) with the RIB inflatable. Roger Stevenson of Skywork Helicopters was used to visit Tawhiti Rahi.

Survey area

The purpose of this trip was purely to revisit all known sites as per WESPKI.

Tawhiti Rahi. All sites were located with the exception of pampas site 2. This site has not been found for several years and due to it's overgrown nature when initially located is unlikely to exist anymore.

Aorangi. All sites were located with the exception of pampas sites at Fred's landing as they were checked last year with no regrowth present.

Method

Searching. Sweeping for known weed sites, with team members spread approximately 10m apart (varying with terrain, veg, expectation of encountering weeds) was the predominant method

employed. The team occasionally split up when terrain prevented working four abreast (e.g. Maroro Plot) or for recce. purposes.

On site. When a weed site was encountered all team members were called in to search.. All site tags and flag tapes were touched up/ replaced as required. Map position and relative bearings to other sites or features were verified and recorded. Records were taken of type, number, maturity and extent of weeds, and action taken.

Database. Updated after return. Recording of information directly onto printout of database in field and transferred to computer upon return.

Mapping. Maps were updated with new sites and existing site locations were relatively correctly positioned on the maps.

Table 1 Summary of results of the weed control on the Poor Knights Islands Sep 2002

Island	Percent Is. Searched	Weed species	Total Existing sites(inc l new)	New sites	Sites not found	Total Sites visited	Sites with weeds (mature)	Sites Clean
Tawhiti Rahi		Mexican Devil	10	0	0	10 (100%)	0 (0)	10
		Pampas	10	0	1	9 (90%)	0 (0)	9
		Total	20	0	1	19 (95%)	0 (0)	19
Aorangi		Mexican Devil	59	0	0	59 (100%)	6 (0)	53
		Mistflower	11	0	0	11 (100%)	0 (0)	11
		Moth Plant	43	0	0	43 (100%)	10 (1)	33
		Pampas	10	0	0	10 (100%)	2 (1)	8
		Total	123	0	0	123 (100%)	33 (2)	90
TOTAL FOR BOTH ISLANDS			143	0	1	142 (99.3%)	33 (2)	109

Note - numbers may be slightly different from maps as some sites have several weed species contained within them and these have been counted as per weed species rather than per site.

Aorangi.

- No new sites were found. No significant finds. Notes to be aware of - the new mothplant site from January needs cautious scrutiny for root regrowth and seedling as most of the moth plant juvenile counts were from this site. The mistflower site from September had nothing in it.
- No mature mexican devil plants were encountered which is a first. All the rest recorded were juveniles. 77% (53/69) of existing mexican devil sites were clean. Down on January (83%) but up on last September (75%).
- 65% (28/43) of existing moth plant sites were clean up on last 2 trips (62%). Total numbers of juvenile plants were down on last season continuing the downward trend.
- No Mistflower plants were found and one pampas was found behind the large rock next to camp on the wave platform.

Tawhiti Rahi. This island is still mexican devil free – however 2 pampas are recorded on the eastern bluffs south of the lighthouse Inaccessible by foot they need aerial attack by helicopter or abseil. Planned to do when doing aerial survey in January.

Island impacts. Very few burrows were collapsed. Bullers shearwaters only just starting to nest.

Recommendations

1. Continue twice annual site visitation and search of at risk areas annually as per WESPki.
2. That further visits have at least one member familiar with the island and its weeds.

3. That the two databases continue to be refined and subjected to statistical analysis to uncover the real meaning of all these results.
4. That the main moth plant area on Aorangi be treated as one site due to boundary definition problems. Weeders to be aware of this and use the site tags as reference points and pay attention to avoiding Hansel and Gretel style following of trails of moth seedlings.
5. That the summer trip to the islands continue as 5 days, weather permitting (3 for Aorangi, 1 for Tawhiti Rahi and 1 for travelling/set/break camp). This would only be possible with an experienced team member familiar with the site locations.
6. That the spring trips continue as 4 days Tawhiti and 5 days on Aorangi. For the purposes of searching different weed free areas and rock stacks on alternate years.

Observations.

As was predicted after the September trip there was a lot of germination due to high rainfall disturbing soil and leaf litter over winter.

Worked Example

Appendix 2 Biosecurity Checklist

Biosecurity Tasks	Completed?	
Have I given clear verbal biosecurity instructions to all trip members?	Yes	No
Have I checked they have understood these instructions?	Yes	No
Have any printed instructions been distributed to team members?	Yes	No
Are all supplies (food and equipment) packed in plastic air-tight and insect-proof containers?	Yes	No
List gear too bulky/awkward to fit into containers here: (Check these items immediately prior to departure!) <ul style="list-style-type: none"> • Gear 1 • Gear 2 • Gear 3 • Etc. <i>Add more as necessary</i> (Suggestion: treat equipment with insect spray and leave overnight to kill ants and any other invertebrates that could be hiding in gear)	Yes Yes Yes	No No No
Has everything been stored in an equipment room in sealed containers?	Yes	No
If not, has it been re-checked immediately prior to departure? (Remember 'extras' like boats, radios, day-bags, last-minute items, etc).	Yes	No
Check with every member of trip: <ul style="list-style-type: none"> • All food packed in sealed bags? • All fresh food items checked for presence of ants, snails and other invertebrates? • Boots and other footwear clean and free of soil/seeds? • Packs kept in invasive-free areas or checked and re-packed since? • Packs, pockets, Velcro fasteners, socks, etc., clean of seeds? • Has anyone in party worked in area of known invasives infestation recently? 	Yes Yes Yes Yes Yes Yes	No No No No No No
IF THE ANSWER TO ANY OF THE ABOVE IS “NO” – THEN FURTHER ACTION IS REQUIRED!		
What are the added risks on this trip? <ul style="list-style-type: none"> • Are any items being stored in areas that are not rodent- or insect-proof? • Are we taking fresh food which may contain ants, insects, soil etc.? • Are we leaving/ travelling at night? • Are there planned stops enroute where invasives could enter or exit? • Do we have bulky or non-invasive proof packages • Is the boat/vehicle we are travelling on invasive-free? 	Yes Yes Yes Yes Yes Yes	No No No No No No
IF THE ANSWER TO ANY OF THE ABOVE IS “YES” – BE AWARE YOUR TRIP HAS EXTRA RISKS!		
Have I addressed these concerns by identifying 'on-the-spot' solutions? (How do I deal with the added risk to minimise potential risk to the site?).	Yes	No
IF YOUR ANSWER TO THIS IS “NO”, THEN YOUR TRIP SHOULD NOT PROCEED UNTIL YOU HAVE ADDRESSED THESE ISSUES!		

Biosecurity Tasks	Completed?	
<p><u>When travelling between sites where known invasives exist, or where invasive species management projects are underway:</u></p> <p>Are you travelling from the site with the least number of invasive species to the site with the most? If not, are you able to change the order of the visits so that the worst site is visited last?</p>	Yes	No
<p>Are you travelling from the site with the least number of invasive species to the site with the most? If not, are you able to change the order of the visits so that the worst site is visited last?</p>	Yes	No
<p>1. <u>Before leaving a site</u></p> <ul style="list-style-type: none"> • <u>Check that all personnel are free of the invasives at the site</u> • <u>Check that all equipment is free of the invasives at the site</u> • <u>Check that all vehicles/boats are free of the invasives at the site</u> 	Yes Yes Yes	No No No
<p>2. <u>In transit to the next site:</u> If any sign of an invasive is detected while enroute to the new destination, STOP! Do not continue to any other site until the problem has been identified and remedial actions implemented. (NOTE: throwing an invasive out the window of a vehicle or overboard from a boat is not good practice. You do not know where it may end up).</p>		
<p>3. <u>On Arrival at Destination:</u></p> <ul style="list-style-type: none"> • Have I inspected all containers for rodent, ant or other invasive entry or damage which could allow such? • Has everything been unpacked or opened up and carefully inspected in an open area? • Have I instructed everyone on rules for disposal of organic and other rubbish? • If planning to go to another site from here, have I considered and established how to apply quarantine procedures before we leave? • If on a daytrip only, have I ensured only day-bags are being taken, and that they have been checked, cleaned and packed only on the day of departure? 	Yes Yes Yes Yes Yes	No No No No No
<p>IF YOU HAVEN'T DONE THESE TASKS, WHY NOT?! PLEASE DO IT!</p> <p>It is not possible to totally eliminate the risk of accidental introduction of invasive species - short of prohibiting all trips to the site. However risks can be minimised. Any non-compliance with the checklist above means that you are putting the flora and fauna of the site at an unnecessarily increased level of risk.</p> <p>Please do your bit to help preserve the conservation values of the site.</p>		