

# **Species Restoration Plan for the Whangawehi Catchment Area, Mahia Peninsula, Hawke's Bay**



A draft plan for the consideration of the Whangawehi Catchment  
Management Group

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## 1. Summary

This plan describes a brief overview of the native wildlife restoration possibilities for the Whangawehi Catchment, a 3588ha area situated on Mahia Peninsula in northern Hawke's Bay. Predator control and habitat enhancement programmes have been underway since 2011, beginning the process of creating conditions that will be favourable for wildlife to return and once again flourish.

The numerous pockets of mature remnant forest, streams, wetlands and the extensive coastal influence make the area suitable for the restoration of a wide range of forest birds, shorebirds, seabirds, reptiles and invertebrates. As predator numbers are reduced and the habitat improves some bird species still present locally will recover on their own, other species may naturally recolonise the area with time, while others will need to be reintroduced. It is those species that will need the WCMG's help to return which this plan focusses on.

The WCMG has operated a mustelid trapping programme for over a year around the wetland and riparian areas along the Whangawehi stream. As this trapping programme is expanded and rodent control is implemented throughout the catchment, the area will be suitable for establishing populations of robin, tomtit, whitehead and rifleman. Pateke (brown teal) and kiwi could also be considered once a landscape scale 'top-predator' control programme throughout the catchment is implemented. In the longer term other reintroduction programmes could be considered for species such kakariki, kaka, a variety of seabirds and reptiles.

Steps to enable this happen over the next five years (2018 – 2023) are;

1. Install and maintain a network of bait stations targeting rodents throughout the catchment,
2. Expand the existing mustelid/cat trapping control programmes to include the forested/pine blocks, pasture boundaries and gullies within the catchment,
3. Install a rodent/mustelid monitoring programme (or recognised method of determining success) throughout the catchment and,
4. Prepare 'Programme Outline' scoping documents for establishing robins, tomtits, whitehead and rifleman.

## **2. Background**

The Whangawehi catchment is the largest catchment of Mahia Peninsula (Appendix 1a and 1b). In 2011, the Whangawehi Catchment Management Group (WCMG) formed, from a group of people with a shared vision to see a better environmental outcome for the Whangawehi catchment.

To reinforce this vision, a Memorandum of Understanding was signed between Tangata Whenua of Mahia, a number of landowners of the Whangawehi catchment, the Wairoa District Council, Hawke's Bay Regional Council, Grandy Lake Forest and the Department of Conservation (<https://whangawehi.com/about/>).

Together with community support, the WCMG has made substantial progress. Over the last six years 6ha of riparian land bordering the Whangawehi stream has been cleared of weeds, fenced and 160,000+ trees and shrubs planted, wetland areas are being restored through fencing and careful management, a number of remnant forest blocks have been fenced to exclude stock, and a trapping programme targeting mustelids and cats is underway. These efforts were recognised in June 2017 when the WCMG received the Green Ribbon Award 'Caring for our water' for an outstanding community-led waterway clean up. It is now time for the WCMG to consider how these biodiversity enhancements will provide habitat for species that could be reintroduced in the future.

Wild Solutions was asked by Nic Caviale-Delzescaux (WCMG Project Coordinator) to provide an overview of those native species which could be established within the catchment, a possible wildlife reintroduction timeline spanning at least the next five years (2018 to 2023), and the necessary steps to enable these initiatives to happen.

Tamsin Ward-Smith and Kay Griffiths (Wild Solutions Ltd) visited Whangawehi Catchment on August 18<sup>th</sup> 2017, accompanied by Nic and Graeme (Taharoa Station, Stock Manager). The day provided an opportunity to see the main habitat types within the catchment and to get a feel for the wildlife restoration potential of the area.

## **3. Introduction**

Mahia Peninsula is located in Northern Hawke's Bay, on the East Coast of the North Island of New Zealand. At 3,588 hectares, the Whangawehi Stream catchment is the largest on Mahia peninsula. There are five landowners within the catchment; Taharoa Station owned and farmed by Pat and Sue O'Brien, Pongaroa Station owned by Sir Michael Fay, Okepuha Station owned by Richard and Anna Coop, a large pine block owned by Grandy Lake Forest, and Mahia Peninsula Scenic Reserve managed by the Department of Conservation.

The catchment contains a range of habitat types which are described below with reference for their potential to accommodate wildlife.

#### **4. Habitats of the Whangawehi Catchment**

##### **Pastoral land (1937ha) and pine plantation (1000ha)**

Most of the peninsula is now farmed, with only isolated remnants of the original coastal forest remaining. A large proportion of the catchment, around 1937ha, is used for sheep and cattle farming. These grazed pasture areas can provide useful habitat for a number of native species like kiwi and pateke. At Cape Sanctuary, both these species are often seen roaming the paddocks at night feeding on soil and grass invertebrates (Ward-Smith, pers. comm.).

On the west side of the catchment, adjacent to Mahia Peninsula Scenic Reserve and bordering the Whangawehi Stream, is a 1000ha pine plantation managed by Grandy Lake Forest. Pine forest can provide excellent habitat for many forest birds including robin, tomtit, whitehead, rifleman and kiwi.

The pine trees are approximately 15 years old and will be harvested from around 2025 onwards. There are a few mustelid traps serviced by Grandy Lake Forest (Appendix 6) but no control targeting rodents.

##### **Forest fragments (170ha)**

The catchment contains a number of forest fragments, some which have been fenced to exclude stock and others which are still grazed.



There are seven Recommended Areas for Protection (RAPs) that lie within the boundaries of the Whangawehi Catchment (see Appendix 2). While most are relatively small in size collectively (together approx. 170ha) these forest fragments are of great importance. They represent the last remaining examples of original forest left on the peninsula including old swamp forest and mature semi-coastal forest

(Appendix 2 from Whaley et al. 2001). They also provide valuable 'old' forest which can be used by some species that prefer to nest in the limbs or cavities of mature trees (i.e. rifleman).

In 2016, 5ha on Taharoa Station along with some other smaller forest fragments were fenced to exclude stock. These remnants will provide essential corridors and 'stepping stones' to enable birds to disperse throughout the catchment. Currently, the understorey of these forest blocks is sparse in vegetation cover. Fencing to exclude stock will allow the understorey to regenerate and this will also enhance the habitat for ground dwelling species such as kiwi.

### **Mahia Peninsula Scenic Reserve (371ha)**



Most of the original vegetation on the peninsula has been reduced, through burning, clearance and logging to remnants of less than 60ha, with the exception of Mahia Peninsula Scenic Reserve (371ha) managed by DOC. The reserve represents one of the last pieces of lowland coastal forest remaining on the east coast. 147 native plant species have been recorded within the forest including rewarewa, kohekohe, tawa, rimu, matai, karaka, cabbage tree and

lancewood and an understorey of some less common species such as NZ Blueberry (*Dianella nigra*), Hen and Chicken fern, *Libertia grandiflora*, New Zealand broom, northern rata, wharangi and whau. A full list of plants identified in the area is provided in Appendix 3 (from Whaley et al. 2001).

The local Wairoa Department of Conservation operates a mustelid control programme in the reserve consisting of 66 DOC200 traps which are serviced monthly (H. Jonas, pers. comm.). A bait station network for rodent control has also been installed although this has not been maintained (H. Jonas, pers. comm. see Appendix 4). Tracking tunnels to monitor rodent and mustelid activity (3 lines each of 10 Black Trakker tunnels at spaced at 50m intervals – see Appendix 5) are also in place but have only been operated once (Roper, pers. comm.). The reserve will be suitable for many bird species (e.g. robin, tomtit, whitehead, rifleman, kaka, kakariki) as it contains mature forest and has a reasonable understorey of ferns which will be favourable for kiwi.

### **Whangawehi Stream and riparian zone – 60ha**

The Whangawehi Stream is the dominant feature of this catchment. The source begins near the northern end of Mahia Peninsula, between Mahia Beach and Mahia settlements, and after meandering over 13km, flows into the Pacific Ocean at

Whangawehi. There are three main tributaries; an unnamed stream drains from the Mahia Peninsula Scenic Reserve, the Urumatui Stream and the Mangatupae Stream.

In 2014, a 6ha riparian strip along the lower Whangawehi was heli-sprayed to remove blackberry and other weeds and fencing of the area started. By September 2014, 160,000 trees had been established. In December 2014 mustelid trapping began along the Whangawehi stream (Appendix 6 – location of traps). This zone will be favourable for species such as pateke and fernbird, and in the longer term species such as kakariki which flourish in this type of regenerating coastal vegetation.

### **Wetland areas, ponds and farm dams – 50ha**

Hans Rook and John Cheyne visited Whangawehi Catchment in November 2016 to advise on management of the wetland areas. Advice on how to enhance the existing 30ha Whangawehi wetland for wildlife is covered in detail in their report (Rook and Cheyne, 2016). An intensive trap network is operational around the wetlands, alongside the Whangawehi Stream (Appendix 6).

There are also a number of small ponds or farm dams in the catchment area. With some additional management (described below) each of these will provide useful habitat for scrubland and water birds such as bittern, banded rail and fern bird.

## **5. Fauna of the area**

The fauna remaining on the peninsula today is likely to represent only a snapshot of what would once have existed here. Mahia's long history of human habitation, habitat clearance and isolation from other mature large forest tracts have led to a far less diverse assemblage of wildlife than present elsewhere in the ranges.

Historically, kereru, tui, long tailed and shining cuckoo, and kaka were once plentiful in the larger patches of bush on the peninsula (Phillips, 1948). Weka were also abundant up until 1907 but were considered locally extinct by the 1940s. There are no written records of kiwi ever having been on Mahia Peninsula, although it is likely they once were as a kiwi was reported to have been caught by a contractor's trap (Malcolm Smith, pers. comm., DOC). The kiwi in the area would have been North Island brown kiwi now considered part of the 'eastern taxon'.

Today, there are still around 12 native bird species recorded in the area – silvereye, kereru, tui, fantail, grey warbler, bellbird, shining cuckoo, kingfisher and morepork are still common, as are the usual introduced birds such as song thrush, blackbird, starling, sparrow, myna, Californian quail and Australian magpie.

The Whangawehi Catchment has only a small coastal frontage where the Whangawehi Stream flows out to meet the ocean (Appendix 1a). However, the

peninsula's extensive coastline strongly influences the diversity of wildlife in the area providing habitat for over 30 species of seabird and shorebird like white-faced storm petrels, red and black billed gulls (now listed as Critically Threatened), blue penguin, reef heron, Caspian and white fronted terns. Nearby Portland Island, only a short distance across water from the tip of the peninsula, has a significant breeding population of black-winged petrel and Australasian gannets.

The majority of the wetlands on the peninsula have been modified by drainage, stock and weed invasions, however, what remains of these areas provides valuable habitat for mallard, pukeko, grey duck and black shag. The critically threatened Australasian bittern or matuku, along with spotless crane, grey teal, fernbird and Australasian shoveler have also been reported locally in the Whangawehi wetland (H. Rook, pers. comm.).

A full list of bird species present known to be in the area is provided in Appendix 7 (from Whaley et al. 2001).

## 6. Restoring forest land birds

As predator numbers are reduced and the habitat improves some bird species still present locally will recover on their own, some may naturally recolonise with time, while others will need to be reintroduced.

Below are some recommendations for species which *will need* to be translocated back to the catchment. Initially, this would involve rebuilding populations of species that are absent but still relatively common in the native and exotic forests of nearby Ecological Districts; species such as tomtits, robins, whitehead and rifleman. As the project builds a success translocation track record then other species could be considered like kakariki and kaka.

### **Tomtit - Miromiro** (*Petroica macrocephala toitoi*) – Not Threatened



Tomtits should be one of the first species to be re-established. They would flourish in the Scenic Reserve as well as in the pine forest. They would also spread to inhabit forest fragments throughout the catchment.

How many: 20-30 birds each year for three years (total of 60 of approximately an even gender ratio).

**Male tomtit**

Where from: Potential sources could be from Boundary Stream Mainland Island (Maungaharuru ED near Tutira), local forestry blocks or native forest within nearby Ecological Districts of Tiniroto or Waihua (see Appendix 8 – map of Ecological Districts).

When: 2019 onwards – will require effective rodent control (i.e. rat tracking rates <5%).

**North Island robin - Toutouwai (*Petroica longipes*) – At Risk (declining)**

Robins are also good candidates as pioneer species; they can be caught relatively easily by training to feed on mealworms, are robust during transfer, and are inquisitive so good for advocacy as they often show interest in visitors.



Like tomtits, robins would do well in the Scenic Reserve and pine forest, and would spread to inhabit forest corridors and fragments throughout the catchment.

How many: 20-30 birds each year for three years (total of 60 of approximately an even gender ratio).

**Male North Island robin**

Where from: Potential sources are Boundary Stream Mainland Island (Maungaharuru ED near Tutira), local forestry blocks or native forest within nearby Ecological Districts of Tiniroto or Waihua.

When: 2019 onwards – will require effective rodent control (i.e. rat tracking rates <5%).

**Whitehead – Popokotea (*Mohoua albicilla*) – At Risk (declining)**



Whitehead would also establish well at Whangawehi, particularly within the pine forest. They are a flocking species that is characterised by noisy inquisitive groups moving through the canopy – the males have distinctive whiteheads.

**How many:** 60 birds released over 2 – 3 years would provide a good founder population.

**Male whitehead**

Where from: Boundary Stream Mainland Island, local forestry blocks within Waihua and Tiniroto ED.

When: 2019 onwards – will require effective rodent control (i.e. rat tracking rates <5%).

**Rifleman - Titipounamu (*Acanthisitta chloris*) – At Risk (declining)**



Rifleman are the smallest New Zealand bird weighing only as much as a dry teabag. They belong to the tiny ‘wren’ group, an endemic family, of which there are only two of formally six, surviving members (rock wren and rifleman). Their call is high-pitched and often goes unheard (men over the age of 50 usually struggle to hear them) – it is sometimes even harder to see them.

**Male rifleman**

How many: A transfer of around 60 birds over 2 – 3 years would provide a good founder population. A ‘top-up’ transfer may be needed over the following years.

Where from: Good numbers of rifleman still exist at Boundary Stream Mainland Island. Source populations may also be found within the Tiniroto ED.

Nest boxes with tiny entrance holes can help protect rifleman from rat predation, although most of the mature forest habitat within the catchment will be favourable for rifleman to build their own natural nests which they will probably prefer.

When: 2019 onwards – require effective rodent control (i.e. rat tracking rates <5%).

Robin and tomtit, along with many of the other smaller forest birds, are particularly vulnerable to predation from rats. While populations of these species still persist in areas where there is no pest control, translocations to new sites would only be approved to areas that can demonstrate that there is effective rat control. Generally, bait stations spaced on a grid of 100 x 75 m, will reduce rats rapidly to levels where forest birds can establish and steadily increase in numbers. Translocation programmes for all four species above could be possible within a year of installing a bait station network.

## **North Island brown kiwi (*Apteryx mantelli*) – At Risk (declining)**

The Whangawehi Catchment could support kiwi and benefit their recovery in two ways; firstly because of its substantial size it has the potential to accommodate a large population, possibly 100-150 pairs (one pair/10- 20ha) and secondly, bush patches within the catchment could function as small crèche or rearing sites for young birds.

How many: To establish a genetically diverse population, around 60 kiwi (even gender ratio, sourced from at least 10 different parent pairs) would need to be released over 2 to 3 years.



Where from: Juveniles sourced from Operation Nest Egg (ONE) and Chick programmes would be used as founders. This technique involves removing eggs from wild kiwi nests, hatching the eggs at captive facilities and rearing the chicks to at least 800gm, before releasing them.

Recently, community-led kiwi projects within the eastern brown kiwi region together with Kiwis for Kiwi have been working on a strategy that collectively will grow kiwi numbers by 2% annually. This shared goal may facilitate the process of ‘where to source’ kiwi for new

populations such as Whangawehi/Mahia.

Whangawehi could also provide a ‘creching’ or rearing facility for chicks from throughout the eastern brown kiwi region. This would require forested areas to be ring fenced to retain kiwi chicks. An area of 1-2ha per chick is needed for chicks to grow optimally and so bush patches of at least 10ha would be necessary. Chicks would be crèched until 800gm (usually for around 12-14 weeks) when they could be released into the catchment or transferred to other sites. The fenced areas would only prevent kiwi dispersal and would not be predator-proof (as this would be extremely expensive, \$250/m). Effective mustelid control would therefore need to be operating throughout the catchment.

When: Kiwi and particularly young chicks are the *litmus test* for how effective mustelid and cat control is. Chicks under 800gm are vulnerable to predation from stoats, while ferrets, un-controlled dogs and cats are still a threat to large adult kiwi. DOC recommends best practice trapping guidelines to provide kiwi safe conditions (Sporle, 2016) – approximately 1 trap/2ha. Generally, these criteria are required to be met before a translocation of kiwi to a new site could proceed.

Kiwi also disperse widely traveling up to 5km in only a few nights. It will be essential that there is access for vehicles and people for kiwi monitoring across the peninsula as kiwi will need to be monitored frequently so that their survival and dispersal can be followed.

In the long-term (20+ years), Mahia Peninsula could potentially support a huge (>500 pairs) kiwi population which would also in time function as a 'kiwi kohanga' – a site where once the kiwi population approaches carrying capacity the surplus juveniles can be collected and released to boost other populations.

## 7. Restoring wetland birds

The riparian and wetland enhancement already underway will provide excellent habitat for a number of bird species, some which will recolonise naturally and others will need translocating.

### **Pateke – brown teal** (*Anas chlorotis*) – At Risk (recovering)

Pateke are a rare, mostly nocturnal, endemic duck that would have once been widespread throughout New Zealand occupying swamps and swamp forest. They have a reputation of behaving more like a 'forest duck' than a 'water duck' as they often feed on land at night and do well with access to only small streams or ponds. At Cape Sanctuary they are often seen, far from water feeding on pasture invertebrates. Pairs can be extremely territorial and a single pair is capable of monopolising a large water area and excluding all others.



Convoluting stretches of water along the Whangawehi Stream will be favourable for pateke, particularly spots where they are able to climb out of the water easily (i.e. sloping access not a steep drop-off). The extensive planting alongside the stream will provide excellent habitat for pateke. Pateke also use stock dams and ponds like the one below left, although some habitat enhancement will be needed. Fencing off and planting up a corner of each dam will provide sufficient cover for pateke to roost in during the day and still allow for stock access. Larger ponds (below right) may also be used as flocking sites where juveniles can congregate in late February before heading off to find a mate and a territory.



**Dam on Pongaroa Station**



**Large 'flock' dam on Pongaroa Station**



**An example of fencing and planting a dam for pateke, 2008 (left) and 2010 (right).**



Floating pontoons provide a 'safe' roosting platform. Supplementary feeding can also help reduce dispersal following release.

**How many?** It is likely that a release of 20-40 radio-tagged juveniles would be trialled in the first year. A decision would be made after that as to whether to support further releases.

**Where from:** New pateke populations are established using juveniles bred in the Captive breeding programme.

**When:** Pateke are extremely vulnerable to predators, particularly cats and mustelids. The same level of top-predator control necessary for kiwi, will be required for pateke to establish and survive. Some pateke also disperse widely and so it would be necessary to have access across the peninsula for monitoring to keep track of the fate of individuals.

Fernbird – Matata (*Bowdleria punctata*) – At Risk (declining)



Fernbirds were once widespread throughout New Zealand in swamp, fern land and low scrub. Although, there are still a handful of fernbirds reported on Taharoa Station, the population would benefit from a translocation boost.

Fernbirds can be found at Opoutama Wetland but being poor fliers it could be sometime before they disperse and colonise the Whangawehi wetlands. There are probably not enough at the Opoutama Lagoon to support a translocation. An injection of birds from elsewhere would be beneficial.

## 8. Restoring shorebirds

Blue penguin – Korora (*Eudyptula minor*) – At Risk (declining)

Blue penguins are widespread around Mahia peninsula but have probably been reduced in numbers by mustelids, cats and dogs when they come ashore to roost and breed. They nest in burrows, cavities, under boulders or driftwood and in coastal vegetation. They are also known to readily use artificial burrows (but not always).

In September 2015, Te Mahia School built and installed 13 Little Blue Penguin boxes at the mouth of the Whangawehi Stream outlet to encourage penguins back to the area. To date, the boxes do not appear to have been used. It is possible that dispersing juveniles haven't had time to find the *new accommodation* or that predators are still impacting on recruitment in the area, or... the area is just not favourable.



Penguins are also creatures of habit. At Cape Sanctuary only a few of the installed burrows were utilised despite penguins known to be in the area (even walking beside burrows when they came ashore) and few predators present.

It may be possible to encourage youngsters to use new nesting boxes by translocating young chicks from nearby natural nests to the artificial burrows. This method was successful in relocating penguins in south Australia where they

were at risk of being run-over when they crossed a carpark to get to nesting burrows. Chicks were removed from nests and hand reared for up to three weeks, then placed into their new burrow prior to fledging. This technique seems to work as juveniles are more likely to return to breed from the place where they fledged.

At Whangawehi a small sample of 5 to 10 chicks could be hand reared (fed daily) in captivity for around three consecutive weeks from late September onwards. Just prior to fledging the juveniles would be transferred to the installed burrows – they ‘lock-in’ with their natal area on their first trip to the ocean.

## **9. Restoring seabirds and reptiles**

There is huge opportunity to restore various seabird and reptile species within the Whangawehi catchment and on Mahia peninsula. Although there was not time to visit options for seabird ‘areas’ on the day it would certainly be possible to encourage various species to nest on the land using speaker systems broadcasting seabird calls or through chick translocations.

Table 1 (attached) summarises a proposed species translocation timeline for the next five years, including species that should be considered after that.

## **10. The next steps**

The Whangawehi catchment and wider Mahia peninsula will be home to a number of introduced mammals including possums, feral cats, feral goats, feral pigs, mustelids (ferrets, stoats and weasels), rodents (ship and Norway rats, and mice), rabbits and hares. The presence of these animals will certainly be limiting the rate of natural recovery of forest and wetland birds, invertebrates and reptiles.

It will be necessary to demonstrate that rodents, mustelids and cats are being maintained to low-levels before translocations of robin, tomtit, whitehead, rifleman, pateke and kiwi will be approved.

The next steps necessary before translocations of species can get underway are;

1. Install and maintain a network of bait stations targeting rodents throughout the catchment including the small forest blocks, Grandy Lake Forest pines, pasture boundaries, gullies and stream edges, and re-activate the bait station network installed by DOC in the Scenic Reserve.

Robins and tomtits, along with the other smaller forest birds, are good indicators of the effectiveness of rodent control. Generally, bait stations spaced on a grid of 100 x 75 m, will reduce rats to levels where forest birds can

establish and steadily increase in numbers.

2. Expand the existing trap network

Since June 2016, the WCMG with assistance from Grandy Lake Forest, has operated 250 DOC200 traps targeting mustelids around the wetland areas, through the riparian plantings alongside the Whangawehi Stream and into the Grandy Lake pines (see Appendix 6). Species such as kiwi and pateke which are vulnerable to mustelids and feral cats, and which also disperse widely, will require a landscape-scale network of approx. 1 trap/2-4 ha, throughout the forested/pine areas, pasture boundaries and gullies.

The cat trapping and shooting programme should also be maintained and expanded throughout the catchment.

3. Install a rodent/mustelid tracking tunnel monitoring programme (or recognised method of determining success) throughout the catchment. This will provide an indication of how effective the pest control is (pre-control, post- and ongoing monitoring).

Bait 'take' can be a good indicator of rat presence, however tracking tunnels are the standard method used to measure relative densities of rats and mustelids (Gillies and Williams, 2013). A consistent rat tracking rate of less than 5% is generally required by DOC for translocations of robins, tomtits, rifleman and whitehead to new sites to be approved.



The use of camera trapping or trail cameras is currently being developed to monitor the presence of predators that can be hard to detect using standard methods (i.e. tracking tunnels) or when predators are at low levels. This emerging tool may provide a more sensitive measure of determining how effective the trapping programme is.

4. Begin the DOC permitting process (i.e. prepare Programme Outlines for forest birds – robins, tomtits, rifleman and whitehead). A description of the steps required and expected timeline for this process is described in Appendix 9. It is important to get these documents underway ASAP as they can take far longer than anticipated.

## 11. References

Gillies, C.A.; Williams, D. 2013: DOC tracking tunnel guide v2.5.2: Using tracking tunnels to monitor rodents and mustelids. Department of Conservation, Science & Capability Group, Hamilton, New Zealand.

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## **12. Appendices**

|                           |  |
|---------------------------|--|
| <b>Appendix 1a and 1b</b> | Maps of the Whangawehi Catchment boundaries and land use.                                  |
| <b>Appendix 2</b>         | RAP's listed within the Whangawehi Catchment.  |
| <b>Appendix 3</b>         | Plants identified within the Mahia region.   |
| <b>Appendix 4</b>         | Map of the mustelid traps and bait stations located in the Mahia Peninsula Scenic Reserve. |
| <b>Appendix 5</b>         | Map of the tracking tunnel layout in the Mahia Peninsula Scenic Reserve.                   |
| <b>Appendix 6</b>         | Location map for the mustelid traps operating in the Whangawehi Catchment.                 |
| <b>Appendix 7</b>         | List of birds identified in Mahia region.  |
| <b>Appendix 8</b>         | Map of the eastern North Island Ecological Districts surrounding Mahia peninsula.          |
| <b>Appendix 9</b>         | The DOC process for applying for a native species translocation permit.                    |

| <b>Table 1 Whangawehi Catchment proposed species restoration timeline</b> |   |   |  |   |
|---|---|---|--|---|
| <b>Year</b>   | <b>Species/threat status (Robertson et. al, 2017)</b> | <b>Habitat requirements</b>             | <b>Justification</b>   | <b>Habitat enhancement necessary</b>  |
|   | <b>Forest birds</b>                                   |   |  |   |
| 2018<br>(July/September)  | Blue penguin (At Risk - Declining)                    | Coastal, boulder beaches                | Blue penguin present in the area and effort already invested in restoring birds to protected area. Penguins may need encouragement to begin using the installed roosting boxes – this could involve a trial of chick transfers or using a speaker system to play penguin calls.                      | Review current location of boxes to ensure they are placed where penguins are likely to pass.<br>Dusk observations of penguins coming ashore. |
| 2019 onwards  | North Island robin (At Risk - Declining)              | Native forest, pine forest, shrub lands | Historically, very likely to have been present in forest on Mahia peninsula. Still recorded in nearby Tiniroto Ecological District. Whangawehi Catchment has suitable habitat and likelihood of translocation success is high.<br><br>2 to 3-year programme.   | Install bait station network targeting rodents throughout Grandy Lake Pine Forest, Scenic Reserve and catchment bush blocks.                  |
| 2019 onwards  | North Island tomtit                                   | Native forest, pine forest, shrub lands | Historically, very likely to have been present in forest on Mahia peninsula. Still recorded in nearby Tiniroto Ecological District and possibly Waihua Ecological District. Whangawehi Catchment has suitable habitat and likelihood of translocation success is high.<br><br>2 to 3-year programme. | Install bait station network throughout Grandy Lake Pine Forest, Scenic Reserve and catchment bush blocks.                                    |
| 2019 onwards  | Whitehead (At Risk - Declining)                       | Native forest, pine forest, shrub lands | Historically, very likely to have been present in forest on Mahia peninsula. Still recorded in nearby Tiniroto and Waihua Ecological   | Install bait station network throughout Grandy Lake Pine Forest, Scenic Reserve and   |

|              |   |   |   |  |
|--------------|---|---|---|--|
|              |   |   | Districts.<br>Whangawehi Catchment has suitable habitat and likelihood of translocation success is high.<br><br>2 to 3-year programme.  | catchment bush blocks.   |
| 2019 onwards | North Island rifleman (At Risk – Declining)   | Native forest, pine forest, shrub lands   | Historically, very likely to have been present in forest on Mahia peninsula. Still recorded in nearby Tiniroto Ecological District.<br>Catchment has suitable habitat and likelihood of translocation success is high.<br><br>2 to 3-year programme.  | Install bait station network throughout Grandy Lake Pine Forest, Scenic Reserve and catchment bush blocks.   |
| 2020 onwards | North Island brown kiwi (At Risk - Declining) | Forest, pine forest, shrub lands, pasture | Historically, very likely to have been present in forest on Mahia peninsula. Still recorded in nearby Tiniroto Ecological District.<br>Catchment could provide safe place for large population of eastern brown kiwi, and/or a site to crèche young kiwi chicks before release to boost wild populations outside of Whangawehi catchment and Mahia peninsula.<br><br>2 to 3-year programme. | Expand DOC200/DOC250 trap network throughout the catchment (approx. 1 trap/2 ha).<br>Maintain cat trapping/shooting programme.                                 |
|              | <b>Wetland/shrub land birds</b>               |   |   |  |
| 2019 onwards | North Island fernbird (At Risk - Declining)   | Shrublands and wetlands                   | Remnant population present within catchment.<br><br>Whangawehi Catchment has suitable habitat.<br><br>1 to 2-year programme.  | Wetland and shrub land enhancement in progress.<br>Expand DOC200/DOC250 trap network throughout the catchment (approx. 1 trap/2 ha).<br>Maintain cat trapping/ |

|                               |   |  |   |  |
|-------------------------------|---|--|---|--|
|                               |   |  |   | shooting programme.  |
| 2020 onwards                  | Pateke/brown teal (At Risk - Recovering)    | Wetlands, farm ponds/stock dams, streams, shrub lands, pasture | Whangawehi Catchment has suitable habitat.<br>2 to 3-year programme.  | Expand DOC200/DOC250 trap network throughout the catchment (approx. 1 trap/2 ha).<br>Maintain cat trapping/shooting programme.<br>Habitat enhancement around existing stock dams and ponds – fencing dam corners and planting to provide cover for pateke. |
| <b>Other possible species</b> |   |  |   |  |
|                               | <b>Birds</b>                                |  |   |  |
|                               | Takahē (Threatened – Nationally Vulnerable) | Shrublands, grassland, forest and wet areas                    | Extremely vulnerable to predators such as mustelids and cats.   | Effective mustelid and cat control programme.  |
|                               | Kakariki – Red-crowned parakeet             |  | Possible direct release of birds or establish breed to release captive programme using aviaries.  | Effective mustelid and cat control programme.  |
|                               | Weka  |  | Historically abundant in the area. Natural predators of many native species and for that reason are not selected as one of the first species to re-establish. | Effective mustelid and cat control programme.  |
|                               | Kaka  |  | Historically present in the area.   | Effective mustelid and cat control programme.<br>Soft release of birds from holding aviary.  |
|                               | <b>Reptiles</b>                             |  |   |  |
|                               | Speckled skink                              | Coastal forest, shrubland, boulder banks, sand dunes           |   | Effective rodent and mustelid control.   |
|                               | Spotted skink                               | Shrubland, boulder   |   | Effective rodent and mustelid  |

|  |                          |   |   |   |
|--|--------------------------|---|---|---|
|  |                          | banks, sand dunes                                       |   | control.  |
|  | <b>Seabird birds</b>     |   |   |   |
|  | Northern diving petrel   | Coastal cliffs, low dense coastal vegetation            | Seabirds are ecosystem engineers, diving petrel translocations have high success rate and relatively short time to return.<br><br>Responsive to broadcast calls.  | Install seabird call broadcast speaker system. Require predator free area to establish successfully – potentially ring-fenced enclosure to carry out chick translocations. Four year programme of hand raising young chicks.        |
|  | Grey-faced petrel        | Coastal cliffs and coastal forest, friable soils        | Seabirds are ecosystem engineers, grey-faced petrel translocations have high success rate and proven methods.<br><br>Good success establishing populations through calls broadcast with speaker system. | Install seabird call broadcast speaker system. Require predator free area to establish successfully – potentially ring-fenced enclosure to carry out chick translocations. Four to six year programme of hand raising young chicks. |
|  | White-faced storm petrel | Coastal cliffs and coastal forest, friable soils        |   | Install seabird call broadcast speaker system. Require predator free area to establish successfully – potentially ring-fenced enclosure to carry out chick translocations. Four-year programme of hand raising young chicks.        |
|  | Black winged petrel      | Coastal forest, friable soils, sand dune/forest margins |   | Install seabird call broadcast speaker system. Require predator free area to establish successfully – potentially ring-fenced enclosure to carry out chick translocations. Four-year programme of hand raising young chicks.        |