DRAFT

Taxon Plan for Northland brown kiwi (*Apteryx mantelli*)

Strategic Plan for the recovery of Northland North Island Brown kiwi
for the (ten year) period 2009 – 2019 and beyond,
including key actions required for their recovery.

Authors:
Nicky Renwick
Emma Craig
Wendy Sporle

Lead Conservancy:
Northland Conservancy

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Preface

The 2008-2018 Kiwi Recovery Plan (Holzapfel *et al.* 2008) provides strategic direction, at a national level, to ensure the long term viability of all kiwi taxa[1]. The Kiwi Recovery Group is responsible for its implementation and review.

As the Kiwi Recovery Plan provides general national strategic level advice for many taxa over many regions, it can not practicably recommend management for each individual taxon to the level of detail required to guide work-plans and thus implement successful recovery. This is the role of taxon plans.

This taxon plan was written after public scoping via a series of meetings during October 2007 and discussions with key agencies and people.

Taxon plans translate the relevant goals, objectives and actions of the Kiwi Recovery Plan into a local context for individual taxa at a level of detail sufficient to guide operational plans. As such, taxon plans are key documents for the implementation of the Kiwi Recovery Plan.

Although taxon plans are more operationally-focused than the Kiwi Recovery Plan, they do not provide the level of detail of a workplan. Nor do taxon plans provide details of best practice information which is instead provided at a national level by the Kiwi Best Practice Manual (Robertson, *et al*. 2003).

The accountability for each taxon plan rests with a lead conservancy, in this case Northland, in consultation and guidance with the Kiwi Recovery Group. In Northland the implementation and review of taxon plans will be supported by a 'taxon group'. This group (Northland Kiwi Forum) which represents the key agencies carrying out kiwi recovery in Northland has been initiated.

Taxon plans have been developed in collaboration with key stakeholders for the taxon, including iwi, landowners, community-led kiwi projects and other conservancies involved in its recovery. They have been peer-reviewed by the Kiwi Recovery Group to ensure that they fulfil their role as integral parts of the Kiwi Recovery Plan.

Taxon plans have a 10-year term (staggered by 1 year from the recovery plan). They receive a progress review annually.

Species – a term usually applied to groups of organisms capable of interbreeding and producing fertile off spring. Five species of kiwi are described; North Island brown kiwi, rowi, tokoeka, great spotted and little spotted kiwi.

Taxa – Plural term which includes the five described species and four genetically distinct provenances of kiwi, within each of the species NI brown (Northland, Coromandel, eastern and western) and tokoeka (Haast, Northern and Southern Fiordland and Rakiura).

Taxon – Singular, referring to single taxa.

Summary

The Northland brown kiwi is one of four distinct North Island brown kiwi taxa. At present their distribution is now mainly restricted to the northern-most portion of New Zealand, found between Awanui in the Far North to just south of Whangarei. Remnant small populations are recorded near Warkworth and Tapora. Translocated populations are also found at Tawharanui Open Sanctuary to the north east of Auckland city, and on offshore islands from the Bay of Islands to the Hauraki gulf. Kiwi were translocated to the Greater Auckland area, Hawkes Bay and King Country in the late 1970s and early 1980s after being rescued from land-clearing. The distribution of Northland brown kiwi has retracted and kiwi numbers are estimated to have declined by 90% over the past 100 years. It remains in serious decline today.

The aim of this taxon plan is to halt further decline; *'To restore, and wherever possible, enhance the abundance, distribution and genetic diversity...'* of the taxon, as per the long-term goal in the current Kiwi Recovery Plan (2008-2018).

The development of this taxon plan has been a collaborative effort between the Department of Conservation (DOC) and a wide variety of kiwi practitioners and interest groups involved in the recovery of Northland brown kiwi. 21 goals with 112 action points are identified that sit within three theme headings – management, community relations and engagement, and research and innovation. Each action point sets timeframes and accountabilities to enable them to be achieved.

The priority focus of the plan is increased management effort and support of community based projects. By 2019 it is intended that a minimum of 1900 to 2800 breeding pairs across ten different management sites will be secured from threats in sustained permanent protection. A further 15 management sites will be secured and undertaking effective management of threats.

Dog predation is the single largest predation issue for Northland brown kiwi; resolving this issue through an intensive advocacy campaign, the creation of no dogs zones in some areas, kiwi aversion training for dogs, and through development of dog control techniques, is another important goal of this taxon plan.

A key feature of this taxon plan is the establishment of the Northland Kiwi Forum. The role of the Forum is to facilitate implementation of this taxon plan and provide information and support to community kiwi projects and practitioners. This will ensure that all groups and individuals involved in Northland brown kiwi recovery have access and support to technical and best practice information, have a means of passing on ideas and concerns, as well as guidance with funding applications and advocacy. The Forum will comprise representatives from all sectors including DOC, local government, community groups, Iwi, business, tourism and forestry sectors, Landcare Trust, NZ Kiwi Foundation, and BNZ Save the Kiwi Trust. They will be able to facilitate information between the wider community and the national Kiwi Recovery group to ensure that this taxon plan is achieved and updated as required.

1. Introduction

Of all New Zealand's rare and unique wildlife, it is the flightless, shy and nocturnal kiwi that has captured the hearts and minds of New Zealanders to be adopted as our national emblem. Its name we have claimed to describe our collective identity and its image is widely used to brand New Zealand-made goods, industry, and people.

Yet despite its apparent high profile and iconic status in popular New Zealand culture and its intrinsic value to Maori and all New Zealanders, the species itself is threatened with extinction. Once widespread throughout New Zealand, its abundance and distribution has been severely reduced as a consequence of human arrival and settlement. Ongoing effects of habitat loss, development and species introductions have led to the continuing decline of kiwi at a national level. Despite positive gains in managed populations arising from the widespread effort of the Department of Conservation, iwi, numerous community, industry, and research organisations and sponsorship by the Bank of New Zealand Save the Kiwi Trust, the species remain in decline and as such all kiwi taxa are classified as threatened.

Kiwi is the smallest of all ratites; a diverse group of large flightless birds found throughout Australia, South America, Africa, New Guinea and New Zealand. Their flightless status has made them particularly vulnerable to human induced change and as such many ratites have become extinct, notwithstanding 11 species of moa from New Zealand.

Kiwi are endemic to New Zealand and are a truly remarkable species with some unique characteristics. These include nostrils positioned at the end of their lengthy bill, vestigial wings with no practical function, no external tail, and the production of one of the largest known egg in relation to body size of all birds. It has been widely described as the most '*un-birdlike bird in the world*' (Hutching 1998) having many traits closer to mammalian species than birds; including the presence of bone marrow, lowered body temperature, hair-like feathers, facial bristles and an acute sense of smell.

At present there are five recognised species of kiwi:

- brown (*Apteryx mantelli*), including four distinct populations,
- Rowi - Okarito brown (*A. rowi*),
- little spotted (*A. owenii*),
- Roroa great spotted (*A. haastii*), and
- Tokoeka (*A. australis*), including three distinct populations.

Within *A. mantelli* there are four geographically isolated and genetically distinct taxa. These are located in Northland, Coromandel, Eastern North Island (Hawkes Bay, East Cape and Bay of Plenty to Rotorua) and Western North Island (King Country, Tongariro, Taranaki, Wanganui).

This taxon plan relates to the Northland North Island brown kiwi and is the first taxon plan produced to guide its recovery.

Of the 25,000 or so North Island brown kiwi, the Northland taxon consists of approximately 8,000 birds (Holzapfel *et al*. 2008). These birds are scattered amongst some 25-population clusters throughout Northland (Pierce *et al.* 2006), with additional populations on offshore islands and Tawharanui Open Sanctuary. The majority of birds reside on privately owned lands, which in itself raises many issues with regards to management and recovery of the species. Fortunately, Northland also has a very high number of landcare groups and a large population base of people genuinely concerned with the plight of kiwi. More than half of the community-led schemes for kiwi nationwide are found in Northland.

Northland North Island brown kiwi have high fecundity. Despite high egg production and widespread protection efforts, the taxa is still declining and facing extinction, largely as a consequence of high predation pressure from dogs and mustelids and land development.

The kiwi work that occurs in Northland is on both public and private land, and there is huge community responsibility for and involvement in kiwi protection. The role of the Department of Conservation is becoming an increasingly advisory one, as funding is reduced and more individuals and community groups take up active kiwi protection.

This taxon plan is therefore a practical guide for the Department of Conservation and all groups, individuals and agencies interested in the recovery of Northland North Island brown kiwi. It provides the context for recovery planning and examines the current conservation status of Northland North Island brown kiwi; the management and monitoring techniques currently underway; the possibilities for halting any further decline, and for restoring the species in its historical range. Goals and implementation actions are provided under three themes: Management; Community Relations and Engagement; Research and Innovation. It is intended that this taxon plan be used as a guide and framework for all planning and kiwi conservation management decisions.

Northland North Island Brown kiwi currently occur in the Northland and Auckland regions and it is clear that mutual support from these conservancies and numerous iwi and local community groups is required for its conservation to be successful.

This document was produced with the considerable input of the Northland community and belongs to everyone with a passion for saving Northland North Island brown kiwi (herein referred to as Northland brown kiwi). It is also intended to be a vehicle to motivate more people to help recover kiwi.

2. Plan term and review date

The term of this plan ranges from 2009-2019 and will be subject to an annual progress review.

3. Context

3.1 Taxonomy

Understanding the taxonomy of kiwi is critical to their conservation management. Establishing the distribution and abundance of unique taxa assists in identifying conservation units to be managed, thus ensuring that genetic diversity is maintained. Without it, unrecognised diversity may be lost, breeding programs may falter and isolated populations may have an inability to reproduce and respond to disease and environmental change.

Since the earliest study of kiwi taxonomy there has been ongoing debate about the classification of the North and South island kiwi populations. Early taxonomy was based entirely on morphological (physical characteristics) differences. However, the advent of genetics has enabled the identification of marked differences which are not physically obvious..

As a consequence the taxonomic status of both North and South Island kiwi has continued to be refined as further genetic analysis is undertaken. As recently as 2003, Burbridge *et al*, using mtDNA analysis, were able to identify four genetically distinct and geographically isolated taxa within the North Island brown species (*A. mantelli).* These are Northland, Coromandel western and eastern North Island taxa. It is believed that these four genetically unique populations have developed as a consequence of up to 200,000 years of physical isolation (Baker *et al.* 1995) arising from volcanism and sea level change (Holzapfel 2008).

Although there are few physical differences between the taxa, the genetic differences are significant enough that each taxon should be managed as a distinct conservation unit with no translocation of individuals between the fundamental management areas (Herbert and Daugherty 2002). However it is noted that Burbridge *et al*. 2003 also recommended further investigation into the genetic structuring of the North Island brown kiwi taxa to confirm these conservation management units.

Furthermore, within the range of each taxon there are likely to be further localised genetic differences; with Northland brown there is a possible difference from west to east and there may be a latitudinal factor as well (H. Robertson pers comm. 2008).

Just how many species or subspecies of kiwi should be formally recognised has not yet been determined, but using a precautionary principle Northland North Island brown kiwi will be managed separately.

3.2 Biology and ecology

Although the Northland brown kiwi is unique in terms of its genetic makeup, behaviour and ecology, morphologically speaking there are few distinct features that separate this taxon from the three other North Island brown taxa.

The Northland brown kiwi grows to around 40cm in height, and as with all species of kiwi there is a marked difference between the sexes. The adult females are on average 20-30% heavier than the males weighing around 2.8kg, versus the male at 2.1kg (Heather and Robertson 1996; Pierce *et al.* 2006).

Female Northland brown kiwi also have a longer bill than the males; ranging from 11.70-14.20cm in length, as opposed to the males at 8.98-10.56cm (Colbourne and Klienpaste 1983). It is noted that it is not always possible to distinguish a juvenile female from an adult male based on physical attributes alone (Heather and Robertson 1996).

Northland brown kiwi are monogamous and generally pair bond for life. The male undertakes the preparation of the nest and the incubation of the eggs, although on occasion the female may be found in the nest, either by herself or with the male (Colbourne 2002). The nest is typically an excavated burrow, under vegetation and may be beneath logs and tree roots (Pierce *et al.* 2006).

When conditions are suitable (i.e. there has been adequate rainfall) Northland birds demonstrate year-round breeding activity; although egg laying typically starts in June and July with a second clutch laid from October to December (Pierce *et al.* 2006). Eggs are laid about three weeks apart with the first egg often left unattended during this time. They are then incubated for 75-85 days (Pierce *et al.* 2006) before the chicks hatch up to 13 days apart, as fully feathered, largely independent miniatures of the adult. Northland brown kiwi tend to produce two eggs per clutch, and can produce three clutches per season (Burbridge *et al.* 2003).

Northland brown kiwi can successfully breed at one year of age (e.g. on Motuora Island, Rogan Colbourne *pers. comm.*), but 3-5 years is more common (Hugh Robertson *pers. comm.*). Northland kiwi have the highest productivity levels of all kiwi species, but also have the highest adult mortality rates, and as such kiwi populations decline fastest in Northland. Life expectancy of Northland brown kiwi is only 14 years of age as opposed to 40-65 years elsewhere in the country (Hugh Robertson *pers. comm.*). This is largely a consequence of predation in unmanaged populations, particularly by dogs.

The preferred habitat of Northland kiwi comprises damp gullies in both indigenous and plantation forest, and dense shrubland. However, they also commonly utilize wetlands, gorse dominant shrubland and rough pasture. The habitation of plantation forests appears to be unique to Northland and Taranaki populations of brown kiwi (McLennan *et al.* 1987).

Northland brown kiwi are strictly nocturnal, although young chicks are occasionally observed foraging in the daytime (Sporle 2008). Northland brown kiwi generally have multiple daytime shelters within their territory, these may be comprised of burrows, fallen nikau fronds, hollow logs, tight vegetation and slash from land-clearing or forest harvest (McLennan *et al.* 1987).

Northland brown kiwi are fiercely territorial and they will remain in an area once settled for as long as suitable habitat is retained (Pierce *et al.* 2006). They tend to have high overlap with their mate's territory, and will allow chicks and juveniles in their territory, but generally will not tolerate the presence of other adult kiwi (Colbourne and Klienpaste 1983). Juvenile kiwi generally remain within 1km of their natal site for their first six months of life before dispersing up to 20km away (Pierce *et al.* 2006). Territories are largely maintained through vocalisation (Colbourne and Klienpaste 1983, McLennan and McCann 1991) but birds will become combative if required.

Territorial boundaries and the density of kiwi largely depend upon food availability. Where there are more invertebrates and the soil is easier to probe in the moist bush gullies; territory sizes may be smaller. Territory placement is important for kiwi, particularly during dry summer months. Those without access to lower slopes and swamp margins are likely to lose condition (Colbourne and Klienpaste 1983).

Kiwi diet comprises a wide variety of foods, predominantly consisting of invertebrates such as insect larvae, weta, crickets, centipedes, moths, earthworms and spiders, but also occasional fruit, berries and leaves (Robertson and Colbourne 2003).

3.3 Past and present distribution and population trends

In pre-human times kiwi were found throughout New Zealand with the distribution of Northland brown kiwi likely extending throughout Northland from and including the Aupouri Peninsula into southern Northland, and into the Auckland region as well. By the 1970's their range was limited to most forest and shrubland areas between Awanui and the Brynderwyn Ranges (Pierce *et al.* 2006). As recently as 1991 the Northland brown kiwi population extended as far south as Mangawhai Heads in the east and the top of the Kaipara harbour in the west (Butler and McLennan 1991). Unfortunately the 1990's saw a rapid pattern of decline throughout much of Northland, resulting in the localised extinction of kiwi from many areas; largely as a consequence of predation from introduced mammalian predators, particularly dogs and mustelids (Pierce *et al.* 2006).

The current distribution of the Northland brown kiwi extends from the translocated population at Tawharanui in the south to Whakaangi in the north (Refer Figure 01). Kiwi are all but extinct from southern Northland and the Aupouri Peninsula. They also occur on offshore islands from the Bay of Islands to the Hauraki Gulf, including: Motukawanui, Motuarohia, Moturoa, Moturua, Matakohe/Limestone Island, Kawau Island, and Motuora (Colbourne 2005). Ponui Island has kiwi that are mixed-provenance Northland and Taranaki birds. Mixed-provenance populations will be considered in all relevant taxon plans.

There are also unconfirmed reports of possible kiwi present in northern parts of the Auckland Region around Leigh and Tapora. Surveys in these areas have failed to find

evidence of any birds currently present, although locals maintain they are there (per comm. Thelma Wilson).

Within the known range of Northland brown kiwi there are estimated to be 25 primary population clusters, within in seven main geographical groupings (Pierce *et al*. 2006). These are:

- Kaitaia,
- Bay of Islands,
- Western / Kauri Coast - Opouteke, Tutamoe-Trounson-Waipoua area
- Eastern - coastal locations from Russell Peninsula to Whangarei Heads
- South Central - Purua-Marlow-Motatau and Pipiwai areas
- Tawharanui
- Offshore Islands

Insert Figure 01 **Approximate Distribution and relative abundance of Northland brown kiwi**

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The range and abundance of Northland brown kiwi has been significantly reduced as a consequence of habitat destruction, predation and natural and artificial barriers to dispersal, all of which remain ongoing issues for the conservation of this taxon (Pierce *et al.* 2006). In 1996 McLennan *et al.* calculated that North Island kiwi abundance had probably declined by at least 90% in the last 100 years.

The 2008 population estimate for the Northland brown kiwi is around 8,000 birds. At around 32% of the total North Island brown kiwi taxa, this is considered to be a stronghold for the species (*Apteryx mantelli*). If current management effort is maintained this population is expected to climb to 8500 birds by 2018. This estimate is based upon a 3% annual decline for unmanaged populations and an annual increase of 9% in managed locations (Hugh Robertson unpubl. data, in Holzapfel *et al*. 2008).

Essentially this predicted increase is nominal as it is such a minor gain for a ten year timeframe and in essence assumes that all the current efforts are achieving is maintaining the population but not securing its recovery. As noted in the current Kiwi Recovery Plan, while only 20% of Northland birds are currently under management, their increase approximately equals the assumed decline in the unmanaged populations.

The population potential for Northland brown kiwi in managed habitats is not well understood as carrying capacities for kiwi are poorly known. There are historical records from the late 1800's that estimate densities of 0.4 to 1 adult kiwi per ha recorded in North Island forests (Buller 1877, 1888 in McLennan *et al.* 1996). These densities are not unheard of today, with densities of one pair per 2-5ha currently occurring in well-managed Northland forests. Pierce *et al*. 2006 estimated that if all components of a forest area were well managed, a forested area of 1000-2500ha could potentially accommodate 500 pairs. The possibility of reaching such densities

and establishing new populations within the historical range of the Northland brown kiwi are long- term goals of their recovery.

3.4 Threat status

According to the New Zealand Threat Classification Lists (Hitchmough *et al.* 2007), all four distinct taxa of North Island brown kiwi, including the Northland population, are classified as being in 'Serious Decline'. Qualifiers for this threat ranking include recruitment failure, human induced decline and conservation dependency.

Current population estimates conclude that this decline has been slowed to around 2%. Losses in unmanaged areas to some extent are being balanced by population gains in managed locations.

The IUCN Red List of Threatened Species (2008) has the status for *Apteryx mantelli* listed as 'Endangered' and describes a decreasing population trend considered to be '*facing a very high risk of extinction in the wild'* (www.iucnredlist.org).

3.5 Agents of decline and current threats

The reduction in distribution and abundance of Northland brown kiwi is a direct consequence of historical and current human induced factors such as land clearance, hunting activity and predation by introduced mammalian predators. Dogs have been the major cause of decline for northland brown kiwi and they additionally face the same agents of decline as other species of kiwi, although it is noted that the degree of impact varies with local circumstances (Holzapfel *et al.* 2008).

In pre-human times, kiwi populations would have fluctuated in accordance with natural processes such as climate change, glaciations, volcanism and fire. In the North Island, volcanism and sea level changes seem to have been major driving forces in the separation of brown kiwi into various refugia resulting in the genetic divergence of the four recognised taxa (Holzapfel *et al.* 2008).

However the arrival of humans had a significant and adverse affect upon all kiwi populations. Early Maori cleared extensive tracts of land through burning, harvested kiwi as a resource and introduced dogs and kiore, the former a direct predator and the latter a possible competitor for food and habitat. This resulted in extensive range reductions and extinction of the little spotted kiwi from mainland Northland. Upon the arrival of Europeans, both the rate of habitat loss and predation and competition from the new suite of introduced mammals increased dramatically, resulting in the continued decline of kiwi up to present day (Holzapfel *et al.* 2008).

Although hunting activity is no longer a major threat to kiwi, habitat loss and predation by introduced mammalian predators; in particular dogs, stoats, cats, and ferrets, remain ongoing threats to their conservation. In Northland predation

remains the primary cause of ongoing decline in all unmanaged populations (Pierce *et al.* 2006).

Nationally, stoats are considered to be the greatest threat to kiwi populations, responsible for approximately 50% of all kiwi chick deaths (Holzapfel *et al*. 2008). However, dog predation is particularly prevalent in Northland and evidence indicates that dogs are the biggest threat facing Northland kiwi (Miller and Pierce 1995). Dogs can cause massive and rapid localised reductions and are able to kill kiwi at all life stages; of particular concern is the death of adults that catastrophically affects population recruitment. Dogs are a particular threat where kiwi occur in close proximity to human settlements or in areas of habitat popular with pig hunters, both of which are relatively common in Northland. There have also been reports of feral dogs living and breeding in Northland forests.

Stoats are present in all kiwi habitats in mainland Northland and are a threat to the egg and juvenile life stages (Pierce *et al.* 2006). Dogs and stoats are overwhelmingly the key predators of Northland kiwi, however ferrets and cats are also locally significant. Feral and domestic cats kill kiwi chicks and sub-adults and occur throughout most areas of kiwi habitat in Northland. Ferrets are capable of killing adult kiwi and although not abundant in Northland, they are locally common and there their impacts upon kiwi are likely to be severe (Pierce *et al*. 2006).

Northland kiwi also face predation and food competition pressure from introduced species such as possums, rats, hedgehogs and pigs. They are also vulnerable to vehicle strike, entrapment in possum traps and cattle stops, and drowning in ponds, cattle troughs and swimming pools (Pierce *et al*. 2006). Their frequent occurrence in settled areas has led to their vulnerability to urban-based activities and domestic pets.

Current threats to the Northland taxon also include genetic bottlenecking in isolated populations, artificial and natural barriers to dispersal, and further fragmentation of habitat arising from development pressure.

3.6 Past and current management

Under the guidance of the first and subsequent Kiwi Recovery Plans (1991-1996 and 1996-2008) the following key actions have been undertaken to aid the recovery of the Northland brown kiwi taxon:

3.6.1 Advocacy

National efforts to raise awareness of the decline of kiwi populations commenced around 1991 with Northland the pilot area for intensive advocacy work. This was initially funded by DOC and BNZ Save the Kiwi (then Bank of New Zealand Kiwi Recovery) and involved extensive work in the community including door knocking, school and community presentations, marae visits, displays at open days and various community events, media articles and newsletters, publication of kiwi education

resources, recruitment of kiwi call-count volunteers and facilitating private landowner and community based kiwi protection initiatives.

This has resulted in the high level of community and privately led kiwi protection projects and the elevated public interest in the conservation of Northland brown kiwi. Work is ongoing in this area with kiwi advocacy now focussed predominantly on assisting landowner and community groups with their kiwi protection projects and access to external funding providers, in addition to encouraging these groups to establish their own advocacy programs as part of their project. Raising the awareness of the need for dog control and facilitating access to kiwi aversion training for dogs that are required to reside or work in or near to kiwi habitat is an ongoing and critical focus of kiwi advocacy work throughout the range of Northland brown kiwi.

It is also noted that numerous other individuals, community projects and agencies have undertaken considerable advocacy work to raise the profile and understanding of the plight of Northland brown kiwi. These include: the Whangarei Kiwi Sanctuary, Trounson Kauri Park and other DOC staff, NZ Landcare Trust, NZ Kiwi Foundation, Queen Elizabeth II National Trust, the Whangarei Native Bird Recovery Centre, and the Whangarei Museum.

Advocacy efforts have also resulted in the provision of kiwi protection in some District Plans, including a requirement for developers to mitigate the effects of development upon kiwi. Further work in this area is required however significant gains include the establishment of pet free communities particularly around Kerikeri, Whangarei Heads and Russell; where local residents have taken ownership of 'their' kiwi and embraced efforts to facilitate their recovery.

An 'Evaluation of kiwi advocacy programmes in Northland and Coromandel' (James 2001) found that '*kiwi advocates are essential to the success of the Kiwi Recovery Programme*' and that advocacy is making an appreciable contribution toward kiwi conservation.

3.6.2 Whangarei Kiwi Sanctuary

The 2000 NZ Biodiversity Funding Package allocated $10 million for the establishment of five kiwi sanctuaries on mainland New Zealand. These were for Haast tokoeka, rowi and three genetically distinct North Island brown populations. This led to the establishment of the Whangarei Kiwi Sanctuary for Northland brown kiwi.

The Whangarei sanctuary comprises 10,000ha of kiwi habitat, of which 200ha is on private land. It includes six separate forested areas spread over 40km to the north and east of Whangarei City. Each forest patch ranges from 70ha to 700ha in size. Several landcare community groups support the Department of Conservation by actively protecting kiwi on private land within the sanctuary areas (BNZ Save the Kiwi Trust 2009).

Insert Figure 02 **Whangarei Kiwi Sanctuary** MAP

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The purpose of the sanctuary is to enhance the mainland kiwi population by intensively controlling predators, in particular dogs, stoats, cats and ferrets. The Whangarei and Coromandel sanctuaries are the only sanctuaries in which cats and dogs are a particular focus. The aim of the kiwi sanctuaries is to enable the recovery of the most critically endangered kiwi taxa and maintain the overall genetic diversity of kiwi (Robertson 2004). They also have a role in testing recovery methods that can then be applied by other projects.

A critical chick survival threshold of 17% has been calculated as the minimum required to maintain stability in a population (H. Robertson per comm). Chick survival is measured against their body weight reaching 1.2kg, at which point they are more able to defend themselves against stoats. This is the critical stage where management can make a significant difference to kiwi recovery (Robertson 2004). Monitored chick survival rates within the Whangarei sanctuary are currently exceeding this threshold.

The Whangarei Kiwi Sanctuary used BNZ Operation Nest Egg™ sub-adults to augment the population at one of the sanctuary's largest forest blocks; Bream Head. To date the sanctuary has been deemed successful with increased breeding activity, including (unusually) birds breeding in their second year. Although the exact kiwi population within the sanctuary is not known, in 2008 a study undertaken by Carlin and Murphy estimated the kiwi population under DOC management within the Whangarei area at 2089 birds.

Research and monitoring of chick survival, population growth, effects of pest control on other biota, and development of cost-effective and sustainable pest control techniques, are key areas of focus of the sanctuary. Recent research undertaken within the sanctuary areas has involved monitoring chick survival in relation to a reduced frequency of stoat trapping. Recent unpublished results are not looking favourable although there is speculation as to whether or not it is the reduced frequency of effort, or stoats becoming trap shy (H. Robertson pers comm. 2009).

3.6.3 Other Department of Conservation projects

Trounson Kauri Park
Work undertaken at Trounson Park has resulted in a greater understanding of the threats of kiwi, impacts of introduced predators and the testing of effective management regimes. Kiwi chick survival has been monitored to assess mustelid trapping effectiveness. Early work was instrumental in developing best practise mustelid control practises.

Waipoua Forest

The Waipoua, Mataraua, Waima continuum, often referred to generally as the Waipoua Forest, which is Northland's largest remaining tract of native forest and once considered to hold one of the North Island's largest kiwi populations. Kiwi in the Waipoua Forest, although are still present in most areas, have declined (through call count monitoring), are at low densities (shown by kiwi dog surveys) and urgent work is needed to prevent the extinction of this population. The issues affecting the population decline are evidently not just a juvenile recruitment problem. The rapid rate of decline has to be due to significant adult mortality (ferrets and dogs) rather than just a lack of recruitment (stoats), given that NI brown kiwi can have a life expectancy of forty years where dogs and ferrets have no impacts (H. Robertson, pers.com).

Waitangi Endowment Forest harvesting regime kiwi management by DOC bay of Islands
Prior to forest harvesting (logging) kiwi were located and transmitters were attached. Those within the imminent harvest area were relocated nearby. Each morning a kiwi technician checked location of kiwi and reported to the logging crews where kiwi were. If they could be 'worked around' this would happen. If not they would be temporally relocated.

Mimiwhangata and surrounds
The Whangarei area office carries out pest and predator control for kiwi and other species in the southern Bay of Island area.

3.6.4 Community projects

The conservation and protection of the Northland brown kiwi is in no small part a consequence of the effort and determination of landowners who have undertaken habitat retention, enhancement, and pest animal control. Some of these private landowner protection efforts pre-date the establishment of the Department of Conservation, Kiwi Recovery planning and BNZ Save the Kiwi, and have continued to present day.

Currently there are approximately 38 sites on both private and public lands across the Northland and Auckland regions that are (or are in the process of) being actively managed for kiwi protection (Refer Appendix 3). These include collaborative projects involving landowners, DOC, community and Landcare groups, NZ Kiwi Foundation, Queen Elizabeth II National Trust and Hancocks forests (Pierce *et al*. 2006). Numerous other privately owned habitats are managed for general species protection that also benefit kiwi. Virtually all Northland community groups are undertaking integrated habitat management targeting all pest species present, not just those that pose the greatest risk to kiwi populations.

Northland is unique in terms of both the occurrence of kiwi on privately owned lands, and the high level of community interest and effort in kiwi protection. A number of adjoining landowners have combined their protection efforts to maximise benefits to kiwi, with some of the larger projects forming charitable trusts. NZ

Landcare Trust, BNZ Save the Kiwi Trust, NZ Kiwi Foundation and the Department of Conservation have been instrumental in the establishment and support of many of these projects. Some projects are closely tied with the efforts of the Department of Conservation, whilst some work more independently.

Insert Figure 3. Map of **Northland Kiwi Recovery Projects**

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3.6.5 National kiwi call-count monitoring and other kiwi monitoring

The national kiwi call-count scheme is the simplest way to determine presence and relative abundance of kiwi in an area. Annual call-count monitoring has been undertaken by DOC staff and volunteers since 1995 and continues to be used to monitor Northland brown kiwi at 23 original listening stations annually throughout the Northland region (Northern, Eastern, Western, Southern) (Pierce 2008).

Call-count monitoring is also being used to monitor kiwi populations at a growing number of management sites throughout Northland as more community groups become involved. Call-count data from 2008 was received from the following management areas:

- Whakaangi (Berghan Point)
- Mahinepua – Radar Hill
- Waimate North
- Waipoua Forest complex
- Motatau-Marlow
- Purua-Rarewarewa
- Tutukaka
- Whangarei Heads-Bream Head (three clusters).

Although call-count monitoring does not provide an absolute number of birds in an area, Robertson and Colbourne (2003) have found a clear correlation between kiwi call rates and density in high-density populations. The relationship is not so clear at low population densities. Call-count monitoring in Northland has enabled trends in population decline and recovery to be determined.

Call-count monitoring has also proven to be a useful interactive advocacy tool, enabling groups and individuals to experience a somewhat near encounter with live kiwi in the wild.

Some management areas also monitor kiwi through telemetry, recording footprint sizes and kiwi dog surveys.

3.6.6 BNZ Operation Nest Egg™ (O.N.E) and kohanga kiwi

BNZ Operation Nest Egg™ generally involves the removal of eggs or chicks from vulnerable populations, hatching and raising these in captivity until large enough to be returned to the wild. Once hatched at Auckland Zoo of Whangarei Native Bird Recovery Center chicks are moved to a predator free island crèche until they have reached a weight of 1200gms or more, at which point they are considered likely to be able to defend themselves against stoats, and are reintroduced to the mainland. Chicks are sometimes temporarily translocated directly to the crèche where they stay until they achieve the 1200gm safe weight.

Upon removal from island crèches birds are either returned to their original source population or other locations to supplement the population recovery, or used to establish new populations within the historical range of the species. They are only transferred to locations where predator control is being undertaken.

The first island BNZ Operation Nest Egg™ site was established on Motukawanui in the Bay of Islands, it is no longer used for O.N.E and is a self-sustaining population. O.N.E now utilises Matakohe Limestone Island in the Whangarei Harbour and Motuora Island near Mahurangi Harbour for Northland brown kiwi island crèches.

Operation Nest Egg™ chicks have then been used to supplement kiwi populations within the Whangarei Kiwi Sanctuary including Bream Head and Whangarei Heads Landcare Forum areas. They also have been used to found the new population at Tawhiranui.

BNZ Operation Nest Egg™ is an effective means of recovering kiwi populations, particularly where the population is small, there are concerns about fertility or lack of genetic variation (Pierce *et al*. 2006). A BNZ Operation Nest Egg™ bird has a 65% chance of surviving to adulthood – compared to just 5% for wild hatched and raised chicks (www.savethekiwi.org.nz).

Kohanga kiwi are sites under intensive management which have achieved high kiwi numbers and are now in a position to be a source population for other sites. Adult kiwi or chicks are then available for translocation to establish new populations or boost numbers in existing populations. The Whangarei Kiwi Sanctuary is currently the only kohanga kiwi for Northland brown.

3.6.7 Kiwi aversion training for dogs

All dogs regardless of breed and temperament are a threat to kiwi. The safest way of avoiding a dog attacking a kiwi is to ensure it never comes into contact with kiwi. The easiest way to achieve this is to keep dogs out of kiwi habitat at all times. However this situation is not always practicable or achievable. While most dog owners can avoid taking dogs into kiwi habitats, sometimes they may not know kiwi live there, they may dwell close to kiwi areas or they may have working or hunting

dogs that move regularly through kiwi habitat. For these dogs and their owners kiwi aversion training is a useful tool.

Kiwi aversion training is a method of exposing dogs to a kiwi stimulus (usually a freshly dead kiwi and fresh kiwi scats) and inflicting a short electric shock via a collar to the dog if it approaches or shows any interest in the stimulus. This is repeated until the dog shows aversion. Most dogs show strong aversion after the first shock. Dogs should be tested six monthly initially and then if they still demonstrate avoidance, testing can be carried out annually. This method, combined with a supportive owner with knowledge about kiwi, and a good level of dog obedience and control, is a useful tool to help reduce the chances of dogs killing kiwi. It does not make a dog kiwi or bird safe but most trained dogs respond positively by actively avoiding kiwi if they are able (A. Dale 2008 in press).

Advocacy opportunities also arise when delivering the training. At present the connection that kiwi aversion training builds between kiwi practitioners and advocates, aversion trainers and dog owners, and in particular the opportunity for information to be shared, is one of the most effective and valuable tools that Northland has to deal with the issue of dogs killing kiwi.

At present this training is predominantly provided for free in Northland. With the exception of the Whangarei Kiwi Sanctuary, it currently isn't a requirement for hunting dogs when issuing hunting permits to have undergone kiwi aversion training. However it may be a requirement in the future for hunting dogs in DOC reserves south of Awanui where here are no kiwi.

3.6.8 Mainland islands and Mainland Restoration projects

Mainland islands are isolated areas of habitat that are intensively managed for pests for the benefit of indigenous species and ecosystems. They may be fenced or unfenced. They provide save havens for rare and endangered fauna that would otherwise be largely restricted to offshore island sanctuaries. They also provide important opportunities for conservation research, trialling of predator control techniques and translocation of species. Trounson Kauri Park is a mainland island. Mainland Restoration projects have less emphasis on research. Tawharanui Regional Park east of Warkworth is a mainland Restoration project.

Trounson Kauri Park is one of six official Mainland Island projects being managed by the Department of Conservation. Established in 1995, restoration work began in 1996. It is a 445ha mixed old growth kauri – podocarp and broadleaf forest surrounded by c100ha Crown owned leaded farmland. The Trounson Park Mainland Island undertakes scientific practises to develop and assess tools for managing pests and predators in order to allow the recovery and restoration of the kauri forest ecosystem. Kiwi dog survey work was carried out in 2007. Encounter rate calculations (1.09 kiwi per hour and 0.702 kiwi per km) indicate a density of 1 pair per 7.1ha, giving an estimate of 66 pairs in the 450ha forest. Over two hundred birds have been banded at Trounson Park. (Natasha Coad pers comm.)

Tawharanui Open Sanctuary is administered by the Auckland Regional Council with volunteer assistance from the Tawharanui Open Sanctuary Supporters Inc (TOSSI). The sanctuary comprises a narrow peninsula that is largely surrounded by sea. A coast-to-coast predator fence across the inland portion of the peninsula was completed in 2004. Most introduced mammals have been removed aside from hedgehogs, mice and rabbits. Predator reinvasion pressure around the coastal edges of the sanctuary requires constant vigilance and ongoing predator monitoring and control. Northland brown kiwi were first introduced in 2006 with O.N.E birds crèched on Motuora Island, and which are of Whangarei Kiwi Sanctuary origin. Subsequent transfers have occurred and a successfully breeding population is now establishing (www.tossi.org.nz).

3.6.9 Offshore islands

Translocations of Northland brown kiwi to offshore islands have been occurring since the 1890's with the transfer of birds to Kawau Island. Subsequent populations of Northland brown kiwi were established on a further eight islands, many of which were predator free. These island populations include those that have been established as permanent populations or crèche sites for BNZ Operation Nest Egg™ chicks. Not all populations are actively managed nor are they all on public conservation land. Several islands have supporters groups that have been established to assist DOC in fund raising, island maintenance and enhancement.

Insert Figure 4. MAP of **Offshore island kiwi populations**

In-Situ populations

- **Kawau Island.** 2050ha. Governor Grey transferred Northland brown kiwi from the Hokianga to Kawau in the late 1800's and a small population remains there today. These birds face some unique challenges including competition with wallabies for habitat. Predation pressure from introduced mammals and domestic pets (residents or visitors) is also prevalent. Although much of the island is heavily vegetated the forest floor in many places has been severely denuded as a consequence of wallaby browse.

- **Motukawanui (Great Cavalli).** 380ha. The kiwi population was established as a BNZ Operation Nest Egg™ trial site, to ascertain whether O.N.E was feasible, prior to the programme expanding further. Ten kiwi were initially transferred to the predator free island in 1995 and currently it contains a breeding population estimated at some 50-60 birds (Colbourne 2005). Motukawanui is being used as a refuge for Northland brown kiwi salvaged as eggs throughout Northland, protecting the genetic diversity of all Northland stock (Colbourne 2005).

- **Moturoa.** 157ha. Six Northland brown kiwi were introduced from Waitangi Forest by the Wildlife Service in 1982, with a seventh bird added a couple of years later. By 1992 the population was estimated at 20-25 birds (Colbourne 2005).

- **Moturua.** 163ha**.** This population was founded with birds rescued from land being cleared for forestry in the mid-1980's. Despite the presence of predators, including stoats, kiwi remain on this island although the population size is unknown (Colbourne 2005).

- **Motuarohia (Roberton Island).** 66ha. This population was also founded with birds rescued from forest areas in the Bay of Islands about to be logged in the 1980's (Colbourne 2005). The current population estimate is 17 pair. These birds originated from 1 pair and an individual. The island is privately owned with five owners who are collectively undertaking ecological restoration of the island. Dogs and cats are banned.

- **Motukiekie.** 34ha. A small population was present despite the presence of stoats. There presence in 2009 is unconfirmed. The origins of these birds are not known (Colbourne 2005).

Island crèches

- **Matakohe Limestone Island.** 38ha. This island has been established as a crèche site for BNZ Operation Nest Egg™ chicks. The first birds were transferred there in 2001 with subsequent translocations of O.N.E chicks continuing to occur. These birds are wild caught chicks, or eggs hatched at the Whangarei Native Bird Recovery Centre, and are sourced from within 40km of Whangarei City. Upon reaching 1200gms, birds are then transferred to the Whangarei Heads area to supplement the existing population (Colbourne 2005). Predator control is carried out on Matakohe and neighbouring islands as they are within swimming distance of stoats. The Friends of Matakohe / Limestone Island play an important role in the management and enhancement of this island.

- **Motuora. 85.5ha.** This island is the main crèche site for BNZ Operation Nest Egg™ chicks for Northland. The first four O.N.E chicks were transferred there in 1999 after hatching at the Auckland Zoo. Once these kiwi weigh 1200gms or greater they are then transferred to Whangarei Heads or the greater Whangarei area, or to Tawharanui Open Sanctuary. A breeding population has established which will remain on the island although their offspring will join the O.N.E sub-adults and be transferred to the mainland. The island is predator free. Motuora Island Restoration Society coordinate work by thousands of volunteers to oversee the ecological enhancement of this island.

Mixed-provenance island populations

- **Ponui (Chamberlain Island).** 1770ha. This privately owned island contains a population of mixed-provenance Northland and Taranaki (ex Hauturu/Little Barrier Island) birds. Despite the presence of stoats and rodents kiwi are present at very high densities, thought to be as many as ten pairs per 100ha. The population estimate is approximately 350 birds and is thought to have reached carrying capacity (R.Colbourne pers comm). Origins of this population stem from six kiwi from Hauturu and eight from Waipoua forest that were transferred by the Wildlife Service in 1964 (Colbourne 2005). Much of the island is farmed and there is a small resident population of people. Given that this is a mixed-provenance population and needs to be managed independently of the genetically 'pure' mainland population, its future management is complex and requires further discussion.

3.6.10 Research

A wide variety of research undertaken at a national level and within the range of Northland brown kiwi has significantly assisted in understanding the management needs of the taxa. Research into the ecology and behaviour, taxonomy, biology and reproduction, agents of decline, population distribution and trends, predator control techniques, habitat requirements and effectiveness of advocacy are some of the key areas in which significant understanding has been gained.

Habitat management programs such as Trounson Kauri Park and the Whangarei Kiwi Sanctuary provide important sites for research and management trials. At present population modelling and predator control techniques are a particular focus of these sites. Researching habitat requirements in the Whangarei Kiwi Sanctuary has provided some informative results, for example some kiwi have territories exclusively within farmland and carry out all life functions there, including breeding (H. Robertson pers. comm. 1999 from Colbourne 2005).

In 1990, as part of the first aerial 1080 operation over a Northland Forest, intensive research was undertaken on kiwi at the Kakanui / Lookout Area to assess possible impacts, including territory mapping and call count monitoring (Science & Research Internal Report No. 121). Research on aerial 1080 operations have shown these treatments for rodent and possum control additionally allow high kiwi chick survival and population recruitment for two seasons post control due to secondary poisoning effects on mustelids (DOC Tongariro, National Kiwi Hui).

BNZ Operation Nest Egg™ and the use of offshore islands as crèches were initially trialled in Northland and have gone on to be important tools in the kiwi recovery toolbox. BNZ Operation Nest Egg™ continues to play a role in the management of Northland brown kiwi, largely used to supplement existing populations and establish new ones.

The large number of individual landowners in Northland applying lateral thinking to trial and develop their own affordable predator control methods, and the ability of

DOC to rigorously test new methods have been important in the development of best practice.

Identification of key agents of decline and in particular the extent of devastation caused by dogs upon the taxa has been an important research outcome for Northland brown kiwi.

The Whangarei Kiwi Sanctuary has played a role in assisting with national research on many aspects of kiwi biology and behaviour including diet (by providing scat samples and food samples); brain and bill-tip organ function (by providing physical samples); genetic analyses (by providing samples from feathers and eggs); kiwi call analyses; kiwi parasite samples and the accuracy of using trained kiwi dogs to find kiwi. The Bay of Island DOC Area office has supported research and management into kiwi-friendly forest harvest practices.

3.7 Cultural importance

The image of kiwi and Aotearoa/New Zealand have been synonymous for a long time. Kiwi have a special significance to all New Zealanders; they are a *taonga* species, a national icon and unofficial national emblem.

Maori in particular have a strong cultural, spiritual and historic association with kiwi, in which they are recognised as one of the children of Tane the god of the forest. Kiwi feathers are valued as weaving material for kahukiwi (feather cloaks) for people of high rank. They are available to tangata whenua through te patika - a cultural materials committee. European settlers were also entranced with this unique bird which has become widely cherished by all cultures in New Zealand today.

The Northland brown kiwi is highly valued by the Northland community and those associated with the offshore island and Tawharanui populations. Many people live within close proximity to populations of Northland brown kiwi and recognise their role as guardians / kaitiaki of the taxon. This high level of ownership is reflected in the increasing number of people becoming actively involved in kiwi recovery.

3.8 Public awareness, key stakeholders and associates

The public awareness of Northland brown kiwi is relatively high within Northland and this is reflected in the large volunteer contribution to kiwi recovery efforts.

The management of Northland brown kiwi is a collaborative effort between Department of Conservation, BNZ Save the Kiwi Trust, NZ Landcare Trust Queen Elizabeth II National Trust and NZ Kiwi Foundation, captive facilities, research organisations, tangata whenua, community groups, individuals, and councils. In general DOC and the other agencies provide technical advice and information, with community groups and individual landowners taking up much of the active management and protection.

The key stakeholders of Northland brown kiwi are described in more detail in Appendix 4.

3.9 Recovery principles and preferred option for recovery

The selection of goals, objectives and actions in this plan have been directed by the following underlying recovery principles and preferred options of recovery contained in the Kiwi Recovery Plan.

- Prevention of extinction of any species of kiwi as the highest priority.
- Intra-specific genetic variation and distribution to be maintained or enhanced as much as is feasible within the core areas of distribution of each taxon.
- Where possible, kiwi are to be managed within their natural (pre-historical or historical) range or, if outside the range, with the overall aim of restoring them to such sites.
- Mixed-provenance populations form an integral part of recovery planning outside the core areas of distributions for each taxon.
- Kiwi recovery to, wherever possible, focus on gaining maximum benefits to the wider ecosystem.

The preferred option for recovery of Northland Brown kiwi is to sustainably manage kiwi in their natural range by reducing their exposure to predators.

4. Goals

4.1 Long term recovery goal

Long-term goal of the national recovery plan

To restore, and wherever possible enhance, the abundance, distribution and genetic diversity of all kiwi taxa.

Long-term goal of this taxon plan

To restore, and wherever possible enhance, the abundance and distribution of Northland brown kiwi.

4.2 Goals for the term of this taxon plan

There are nine goals in the Recovery Plan under the three theme headings of management, community relations and engagement, research and innovation. Some of these goals are taxon specific, some apply generally. Those from the Recovery

Plan specific to Northland brown kiwi, along with additional goals for the taxon, are listed below:

Management

Goal 1.1: To halt the overall decline of Northland brown kiwi.

Goal 1.2: To minimise the loss of distribution and genetic diversity of populations in the wild.

Goal 1.3: To control pests at all managed sites with populations (as at 2009), above 200 pair. (Whangarei kiwi sanctuary/ Whangarei Heads Landcare Forum, Waipoua/Trounson, Waimate North, Kiwi Foundation/Purerua peninsular and Whakaangi.)

Goal 1.4: To control pests at a minimum of 6 sites with current populations identified as having between 50 and 200 pair and/or where BNZ Operation Nest Egg™ is complementing the population.

Goal 1.5: To secure a minimum of 1600 breeding pairs of Northland brown kiwi from key threats within four of the areas in 1.3. (i.e. 400 pair per site) and to increase breeding pairs by 100% at the sites in 1.4.

Goal 1.6: To encourage and support kiwi recovery projects where communities have kiwi and the capacity to carryout protection management.

Goal 1.7: To work towards establishing ecological linkages at a minimum of two of the five larger protected sites to expand and connect areas of habitat and population clusters.

Goal 1.8: To identify long distance corridors to facilitate gene flow across the region and seek planning support at Council level.

Goal 1.9: To restore Northland brown kiwi to areas of their former range.

Goal 1.10: To halt the predation of Northland brown kiwi by dogs.

Note: The baseline for Goals 1.1 & 1.2 is the current (2009) population size and distribution. These taxon plan management goals have been identified as goals which will be challenging but achievable based on population numbers as at 2009. Goal 1.3 will secure a representative population in each of the northern, western, eastern and southern areas of current kiwi concentrations.

Community

Goal 2.1: To sustain and increase community-led projects for Northland brown kiwi across a broad range of sectors of Northland's society.

Goal 2.2: To establish a local Northland Kiwi Forum to facilitate implementation of this plan and provide information and support to community kiwi projects and practitioners.

Goal 2.3: To establish a volunteer and funding coordinator to assist community groups with resourcing and administration.

Goal 2.4: To increase awareness and opportunity for kiwi aversion training for dogs throughout the Northland brown kiwi range.

Goal 2.5: To increase the advocacy opportunities a live kiwi provides beyond the Whangarei Kiwi Sanctuary area.

Research

Goal 3.1: To support research into resolving the taxonomy of North Island brown kiwi.

Goal 3.2: To undertake or support new initiatives in predator control (with a focus on dogs) and habitat management techniques.

Goal 3.3: To ascertain carrying capacity of Northland brown kiwi and develop strategies for preventing genetic bottlenecks.

Goal 3.4: To undertake or support research into improving kiwi aversion training for dogs and dog advocacy.

Goal 3.5: To undertake or support research into the eco-tourism potential associated with Northland brown kiwi.

Goal 3.6: To undertake or support development of strategies for prevention and response to unknown threats including biohazards.

5. Implementation

The following section outlines the objectives and actions requiring implementation to achieve the above goals. It does this by providing background and a summary of issues for a number of topics arranged in the three themes of Management, Community Relations and Engagement, and Research and Innovation. Taxon plan actions are provided to meet both the objectives and actions of the recovery plan and any additional objectives identified.

Taxon plan actions are numbered, have been prioritised and are time-lined. A summary table of actions is provided as Appendix 1.

Prioritisation has been assigned according to the following criteria.

- Essential: Needs to be carried out within the timeframe and/or at the frequency specified to achieve the goals for kiwi recovery over the term of this plan. Highest risk for kiwi recovery if not carried out within the timeframe and/or at the frequency specified.

- High: Necessary to achieve long-term goals. To be progressed and ideally completed within the term of the plan, with moderate risk if not carried out within the timeframe and/or at the frequency specified.

- Medium: Necessary to achieve long-term goals. To be progressed within the term of the plan, but least risk if not completed within the term of the plan or within the timeframe and/or at the frequency specified.

No actions are 'extras'; a medium priority does not mean that there are no reasons to do it. Priorities are given to assist with choice if required.

Actions are predominantly time lined until 2014 except those relevant throughout the plan-period. This reflects the increasing uncertainty in assigning timeframes beyond 5 years, and the need to review progress for all actions by 2019.

5.1 Management

Management of kiwi populations and the supporting systems that enable this management to be effective, are at the core of recovery planning for kiwi. The advances made over the previous decades in pest control techniques, captive breeding and restoration have demonstrated that the decline in populations can be reversed if the effort is applied.

In Northland, recovery efforts for kiwi have historically focussed upon the protection of individual kiwi, however in recent times management focus has developed into an ecosystem approach where kiwi habitat is managed to the benefit of all indigenous species present. To date there is approximately 52,000ha of habitat under active management for Northland brown kiwi, supporting in excess of 1000 breeding pairs.

A variety of people, groups and organisations are involved in the protection of Northland brown kiwi over a array of habitat types and sizes. It is therefore critical that the sharing of information, best practice and technical knowledge occurs amongst the various stakeholders to ensure recovery efforts are optimised.

Future management for Northland brown kiwi will focus upon the coordination of efforts and information, the increase in protected areas of habitat and establishment of corridors between areas.

5.1.1 Topic 1: Taxon Plan and Northland Kiwi Forum

Background

It is important that a clear strategy for Northland brown kiwi recovery is stated and understood by all stakeholders involved in their active management, and that this is regularly reviewed and communicated to ensure that goals remain relevant and are achieved. The establishment of the Northland Kiwi Forum will provide a means of supporting Northland brown kiwi projects to apply the taxon plan to their specific situation. The Northland Kiwi Forum will be able to oversee the implementation of the taxon plan to the local context, ensure a consistency of approach through provision of best practice information and support, as well as providing an avenue for information flow between the National Recovery Group and individual kiwi projects. The Northland Kiwi Forum will also be in a position to facilitate the sharing of information between the Northland projects, identify opportunities for collaboration of efforts and resources, as well as assisting with monitoring and administrative advice.

Issues

- The Northland Conservancy is accountable for the delivery of this plan, but effective implementation requires a collaborative effort.
- Without regular review plans will become obsolete and irrelevant.
- As knowledge grows and results are achieved the plan will need to adapt.
- Efforts must be coordinated and information communicated to ensure benefits are optimized.
- The successful recovery of Northland brown kiwi is dependent upon all parties working together. It is critical that community-led initiatives and involvement of private landowners are well supported.

Objectives and actions

Recovery Plan Objective(s)
RP Objective 2.1: To develop a nationally consistent, locally relevant recovery planning document (taxon plan) for each of the 11 recognized taxa.

Taxon Plan Objective(s)
Objective 1.1: To establish a planning review process and structure that ensures that the taxon plan remains relevant and effectively informs annual work plans. **Objective 1.2:** To involve key agencies, groups and individuals in the plan implementation and review. **Objective 1.3:** To ensure community-led groups and practitioners involved in Northland brown kiwi recovery are well supported and informed.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Develop taxon plans for each of the recognised 11 kiwi taxa by 2009	2.2	Conservators	Essential

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
1.1	Northland North Island brown taxon plan completed to Conservator sign off.	2009	Essential	Northland Conservancy DOC
1.2	Northland Kiwi Forum formed to facilitate the implementation, review and maintenance of the Northland North Island brown taxon plan. Membership to include representatives from all sectors: DOC, local government, community groups, Iwi, business, tourism and forestry sectors, Landcare Trust, NZ Kiwi Foundation, BNZ Save the Kiwi Trust.	2009	Essential	Northland Conservancy DOC
1.3	The Northland Kiwi Forum will ensure information regarding kiwi management is obtained from the Kiwi Recovery Group and then distributed throughout the range of Northland brown kiwi and its stakeholders. Liaison between KRG and taxon stakeholders is an important role of Forum.	Throughout from 2009	High	Northland Kiwi Forum
1.4	Annual taxon plan review meetings held with Northland Kiwi Forum at the end of each breeding season. At least one additional meeting to be held during the year.	Annually in March & September	Essential	Northland Kiwi Forum
1.5	Resourcing to be secured to service these meetings.	Annually	Essential	Conservators / BNZSKT
1.6	Undertake full review of recovery progress and application of taxon plan at half way point of current plan (2009-2019)	2013	Essential	Northland Kiwi Forum
1.7	Establish a Northland Kiwi Administrator role. This person would be part of the Northland Kiwi Forum but the main contact with community groups and stakeholders and responsible for assisting kiwi projects with accessing funding and support. This would alleviate some of the pressure on community groups to meet their administrative requirements. Funding would need to be secured to support this position.	2010	Essential	Conservators / BNZSKT

5.1.2. Topic 2: Best practice

Background

Over the years, information on best practice in kiwi management has been developed and summarised in the 'Kiwi Best Practice Manual' (Robertson & Colbourne 2003), husbandry manual, captive management plans and pest and predator control guidelines (all available from www.savethekiwi.org.nz). These manuals are updated regularly as new information and technology becomes available.

Issues

- Supporting documents relevant to Northland brown kiwi recovery in existence, or developed during the lifetime of this taxon plan, need to be kept up to date and referred to regularly by all kiwi practitioners.
- The sharing of information, best practice techniques, results and training, needs to be available and regularly updated for all kiwi practitioners, including community-led projects.
- Technical support for all people involved in active kiwi management needs to be readily accessible.
- Monitoring and data collection is vital in the ongoing development of best practice and understanding of population status. It is important to access information from as many projects as possible, yet community based projects often lack the capacity to undertake this work.

Objective(s) and Actions

Recovery Plan Objective(s)
RP Objective 5.1: To ensure that kiwi management is undertaken to a consistent and high standard

Taxon Plan Objective(s)
Objective 2.1: To ensure that management of Northland brown kiwi is undertaken to a consistent and high standard.
Objective 2.2: To ensure that best practice information and technical support is current and accessible to all kiwi practitioners.
Objective 2.3: To ensure that accurate and reliable data is collected from as many Northland brown kiwi protection projects as possible.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Develop and assess variations to current best practice on a case-by-case basis and communicate these to stakeholders throughout the term of the plan	5.2	Recovery Group	Medium
Provide regular technical best practice workshops (e.g kiwi handling, transponder, egg handling) throughout the term of the plan.	5.3	Recovery Group/ BNZ Save the Kiwi Trust	High
Ensure Best Practice is referred to and monitored	5.5	Area	High

through local permit system throughout the term of the plan		Managers/Conservators	

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
2.1	Ensure Best Practice is referred to and monitored throughout the term of the plan.	Throughout	Essential	DOC/Northland Kiwi Forum
2.2	Communicate developments in best practice, management and science to stakeholders.	Throughout	Essential	Northland Kiwi Forum
2.3	Provide regular pest control workshops to those involved in active field work – trapping techniques, sign recognition, monitoring, certification etc.	Annually	High	DOC/Northland Kiwi Forum
2.4	Provide a regular Northland brown kiwi taxon hui for the sharing of information and best practice workshops.	Bi-annually	High	DOC/Northland Kiwi Forum
2.5	Produce a regular newsletter to be circulated amongst all Northland kiwi practitioners and stakeholders.	Annually	High	Northland Kiwi Administrator
2.6	Include update of Best Practice information where relevant to taxon plan half way review.	2013	Essential	DOC/Northland Kiwi Forum
2.7	Develop a Northland taxon website that is accessible to all groups and individuals working on the taxon. This can link to BNZSTK website, but is a standalone site in its own right. Something special to those involved in the Northland taxon. A means of networking, sharing information and problem solving, project results, blogs, events etc. Quite an inclusive community thing. Each group / individual also has a link in which they can enter their monitoring data.	2010	Medium	Northland Kiwi Administrator
2.8	Establish a web site administrator who monitors site, updates technical and national information and collates and processes monitoring data.	2010	Medium	Northland Kiwi Administrator
2.9	Distribute national monitoring and data templates, and where required develop regional ones.	2010 and throughout	High	DOC/Northland Kiwi Forum

Comment [W4]: Do you support this idea?

5.1.3 Topic 3: Reducing agents of decline & habitat management

Background

It is well documented that the primary agents of decline of Northland brown kiwi are habitat destruction and predation. Thus by reducing the effects of these agents of decline the recovery of kiwi populations can occur.

Although the destruction and degradation of habitat have historically played a greater role in the decline of Northland brown kiwi, it remains a current issue in light of increasing development pressure and ongoing unsustainable land management practices. Fragmentation of remaining areas of habitat leads to isolation of kiwi populations and individuals thus inhibiting dispersal, fecundity and gene flow. Protection of remaining areas of indigenous habitat, habitat restoration and the establishment of corridor linkages are critical to the recovery of Northland brown kiwi.

Predators particularly dogs, stoats, ferrets and cats remain the primary agents of decline, with dogs considered the key predator of Northland brown kiwi. Where predators are effectively controlled the decline of kiwi populations is halted and recovery is observed. Predator control is continuous and essential in areas of key habitat but also important within habitat corridors. Historical efforts in predator control have concentrated particularly on stoat management, however in Northland the next frontier for kiwi recovery needs to be addressing and managing the threat that dogs pose for kiwi populations. Pigs, possums, rodents and other introduced mammals should also be targeted as part of a comprehensive ecosystem approach.

The risk of new agents of decline arising from the introduction of new avian (and mammalian) diseases and bio-hazards are also a concern. Vulnerable isolated populations are at greatest risk of catastrophic losses in the advent of such an occurrence.

Habitat restoration and enhancement, and predator control are key components of effective ecosystem management. As our ability to manage individual kiwi populations has increased the focus has changed to protecting kiwi habitat rather than individual kiwi, in this way gaining maximum benefits for the wider ecosystem.

Intensively managed areas present an opportunity to establish sustainable populations of kiwi under similar 'safe' circumstances to offshore island communities. Mainland islands are manageable areas isolated either by predator-proof fencing, geographical features or very intensive pest control. The fragmented Northland landscape lends itself to applying mainland island methods to kiwi habitat management. Numerous isolated habitat patches surrounded by a sea of pasture and narrow necked peninsulas are ideal locations for the application of mainland island management techniques.

As kiwi utilize a wide variety of vegetation types, habitat does not exclusively apply to areas of indigenous vegetation. Northland brown kiwi regularly utilise pine forests, scrub and areas of open pasture, and use different vegetation types at different life stages. As such, kiwi are particularly vulnerable to land clearance and development activities.

Issues

- Northland brown kiwi populations will continue to decline and some will become extinct in unmanaged areas.
- Kiwi recovery can enhance the recovery of other species if an ecosystem approach to the management of predators and habitat is applied.
- Kiwi are long lived and require secure habitats throughout their lifespan and for that of following generations.
- Kiwi utilize a variety of vegetation types at different life stages.
- Habitat loss and degradation continues to occur.
- Land clearing methods and other unsustainable land management practices can threaten and kill kiwi.
- Isolation of habitat patches adversely affects dispersal of kiwi and gene flow.
- Isolated habitat patches provide the potential for the application of mainland island management methods to population clusters.
- Mainland islands (fenced and unfenced) are subject to reinvasion pressure from pests and predators and require an ongoing commitment.
- Predator fences can be effective but also expensive and have ongoing costs. They also inhibit kiwi dispersal. Deer or electric fences around key sites can help exclude dogs while allowing kiwi dispersal.
- Juvenile kiwi can disperse a long way from their natal home. They may leave the relative safety of an area that has predator control and enter areas of higher predator density.
- Predation and impacts by introduced mammals adversely affect kiwi survival.
- Dogs remain the key agent of decline of Northland brown kiwi.
- Feral dogs have been identified in Northland forests
- Predator control is ongoing and expensive.
- There are no contingency plans in place for bio-hazard events.
- Ecosystem and species management affect multiple landowners across property boundaries.
- The use of brodificoum for possum and rat control has resulted in resides being found in dead kiwi livers.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 27.1: To improve the cost-effectiveness of pest control management
RP Objective 27.2: To reduce the impact of dogs on kiwi populations

Taxon Plan Objective(s)
Objective 3.1: To halt the decline of kiwi in Northland and restore populations within their former range.
Objective 3.2: To increase the number of Northland brown kiwi, maintaining sustainable populations within managed areas.
Objective 3.3: To maintain and restore kiwi in Northland to a healthy functioning state across all remaining natural habitats and ecosystems, whilst maintaining genetic diversity.
Objective 3.4: To reduce the effects of predators so that Northland brown kiwi recruitment and survival outweighs mortality.
Objective 3.5: To reduce kiwi deaths by dog predation
Objective 3.6: To establish cost effective landscape scale pest control operations
Objective 3.7: To facilitate kiwi dispersal and gene flow throughout their current and historical range

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
3.1	Identify sites and establish two new populations in areas of their former range from where they are currently extinct	2019	Medium	DOC/Northland Kiwi Forum
3.2	Assess all population clusters currently under active management and identify opportunities to establish corridors between sites (refer to Pierce *et al.* 2006).	2013	High	DOC/Northland Kiwi Forum
3.3	Identify key population clusters and strategies for establishment of corridors across the region as a long-term vision.	2019	Medium	DOC/Northland Kiwi Forum
3.4	Support predator control methods which provide ecosystem and kiwi recovery. This includes resourcing, investigating landscape scale pest control and application of best practice.	Throughout	Essential	DOC / Kiwi Recovery Group
3.5	Work closer with Councils to establish habitat protection and dog control and enforcement strategies.	Throughout	Essential	DOC/Northland Kiwi Forum
3.6	Increase dog aversion training and include hunters, farmers, and rural residential occupants with dogs adjacent to key kiwi areas	Throughout	Essential	DOC

3.7	Complete the certification of all kiwi aversion trainers to enable training throughout the district.	2010	Essential	Kiwi Recovery Group
3.8	Encourage exotic forestry companies to apply kiwi friendly management techniques as per BNZ Save the Kiwi Forest management guidelines.	Throughout	High	DOC and kiwi projects
3.9	Support to trialing of a dog toxin for controlled use with feral dogs	2010	Medium	Kauri Coast DOC
3.10	Swap and/or introduce new kiwi into closed or small populations to increase gene pool	throughout	Medium	DOC and kiwi projects

5.1.4 Topic 4: Kiwi sanctuaries

Background

When the Whangarei Kiwi sanctuary was established in 2000 the initial focus was the development of successful management prescriptions for kiwi protection at key sites. This was achieved by undertaking predator control using both trapping and toxins, BNZ Operation Nest Egg™, and substantial public advocacy. In addition to site-specific kiwi protection, the sanctuary has been a critical site for national research into kiwi ecology and protection, and for the development of new management technologies.

Issues

- The research and practical management techniques utilised and developed in the Whangarei Kiwi Sanctuary will facilitate refinement of best practice techniques for Northland brown kiwi management.
- The Whangarei Kiwi Sanctuary is important to Northland brown kiwi recovery, both in terms of the secured kiwi populations and the advocacy throughout the wider community.
- There are several Landcare groups undertaking predator control on private land within the sanctuary area. Maintaining relationships and supporting Landcare groups is vital to the success of the sanctuary.
- Despite ongoing public advocacy, dog predation within the sanctuary remains a significant threat to kiwi populations.
- Stoat trapping has proven successful with 50-60% of chicks surviving their first 6 months as opposed to just 11% in unmanaged areas (www.savethekiwi.org.nz). However, the frequency of stoat trap checks requires further research to determine the optimal level of effort required to maintain these results.
- The sanctuary is composed of several habitat patches scattered over a large geographical area.

- The potential carrying capacity of the sanctuary areas is unknown.
- BNZ Operation Nest Egg™ can be expensive and does reduce the funds available for monitoring and pest control within the sanctuary. The removal of chicks to be temporarily creched is a less expensive option.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 3.1: To ensure that kiwi sanctuaries continue to be an integral part of kiwi recovery, as sites of successful management and for learning.

Taxon Plan Objective(s)
Objective 4.1: To ensure that the Whangarei Kiwi Sanctuary continues to be an integral part of Northland brown kiwi recovery through successful management.
Objective 4.2: To prevent kiwi deaths from dog predation within the Sanctuary area.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Formally review progress of kiwi sanctuaries by 2009	3.1	Research and Development Group	Essential
Review the goals and wider direction for each sanctuary by 2009	3.2	Recovery Group / sanctuary conservators	Essential
Based on the findings of the review, prepare a new strategic plan for kiwi sanctuaries including their finding structure and the potential for additional sanctuaries by 2009	3.3	Recovery Group / General Manager Research and Development Group	Essential
Initiate a kiwi sanctuary network for dialogue, information and staff exchange amongst sanctuaries in 2009	3.4	Recovery Group / sanctuary programme managers	Medium

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
4.1	Assess the potential for establishment of ecological corridors between Whangarei Kiwi Sanctuary areas and develop a strategy for establishing these.	2010	Medium	DOC
4.2	Assess the necessity of O.N.E against other	2010	High	Kiwi Recovery

	more cost-effective means of supplementing Whangarei Kiwi Sanctuary populations.			Group
4.3	Continue with stoat research and other predator control methods.	Throughout	Essential	DOC
4.4	Maintain relationships and support of Landcare groups and surrounding landowners associated with the sanctuary.	Throughout	Essential	Sanctuary Staff / Whangarei Area Office
4.5	Establish lines of communication with other sanctuary staff throughout the country with regular debriefs / networking events.	Throughout	High	DOC
4.6	Explore the feasibility of researching the carrying capacity of the Whangarei Kiwi Sanctuary.	2013	Medium	DOC

5.1.5 Topic 5: Island strategy

Background

Since the 1890's, conservation management of Northland brown kiwi has involved translocation to offshore islands, the majority of which have occurred in an ad hoc manner, with little long-term planning or strategy (Colbourne 2005).

There are eight islands throughout the Northland and Auckland regions that contain populations of Northland brown kiwi and one (Ponui Island) that contains a mixed Northland and Taranaki provenance population. Six of these islands are privately owned with some having a permanent resident human population. Four of the islands are less than 100ha in size (100ha is generally considered a minimum suitable for kiwi), and introduced mammalian predators (including stoats) are present on several. Community and supporters groups play a critical role in the maintenance and management of several of these islands and kiwi populations.

There is a strong need to develop an island management strategy for all islands currently with, or with the potential to contain, Northland brown kiwi.

Issues

- There is no strategic direction or management plan for offshore populations of Northland brown kiwi.
- The population size on many of these islands is not confirmed.
- Carrying capacity and genetic bottlenecking is not understood.
- Many of these islands still have significant predator issues.
- Privately owned islands / island residents active in kiwi management need support and recognition for their kiwi recovery efforts.

- Dog predation of kiwi is a threat on offshore islands as a consequence of domestic pets belonging to residents and/or the landing of boats.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 4.1: To optimise use of islands for kiwi recovery

Taxon Plan Objective(s)
Objective 5.1: To optimize the use of offshore islands for Northland brown kiwi recovery

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Develop an island strategy for kiwi recovery by 2009, which is consistent with DOCs national island strategy and the national recovery plan.	4.1	Recovery Group/Research and Development Group	Essential

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
5.1	Develop an island strategy for Northland brown kiwi that is consistent with the proposed national island strategy for kiwi, the DOC national island strategy and the taxon plan.	2011	Medium	DOC
5.2	Ascertain more accurate population estimates for all islands containing Northland brown kiwi.	2013	Medium	DOC
5.3	Swap and/or introduce new kiwi into closed populations to increase the gene-pool and address any bottlenecking.	2013	Medium	Doc, kiwi projects
5.4	Provide technical support and networking with landowner/ occupiers with island kiwi populations.	Throughout	High	DOC/Northland Kiwi Forum
5.5	Encourage minimizing the risk of predation by stoats on all offshore island kiwi populations.	Throughout	Medium	Northland Kiwi Forum
5.6	Include the residents of islands where dogs may be present in dog control advocacy and offer opportunities to undertake kiwi aversion training.	Throughout	High	DOC

5.1.6 Topic 6: Island biosecurity

Background

Offshore islands play a part of the recovery planning for all populations of kiwi, including Northland brown. The abundance of kiwi on islands is predominantly determined by the status of threats on these islands, especially the absence of predator or competitor species and to a lesser degree, diseases. Biosecurity plans for these islands will minimise the risk of the establishment of pests, but are no guarantee.

Issues

- An increase of threats on islands with kiwi populations could jeopardise individual island populations.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 7.1: To maintain the current status of threats to kiwi on islands with kiwi populations

Taxon Plan Objective(s)
Objective 6.1: To improve the current status of threats to kiwi on islands with kiwi populations.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Develop, maintain and implement island biosecurity plans and protocols for islands with kiwi throughout the term of the plan	7.1	Area managers / conservators	Essential
Develop contingency plans for kiwi populations on islands as part of taxon plans by 2009	7.2	Area managers / conservators	Essential

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
6.1	Develop, maintain and implement island biosecurity plans and protocols for islands with Northland brown kiwi.	2010 and Throughout	Essential	DOC/Northland Kiwi Forum
6.2	Develop contingency plans for population of Northland brown kiwi on islands.	2010	Essential	DOC/Northland Kiwi Forum

5.1.7 Topic 7: Minimum secure populations

Background

Although Northland brown kiwi are present in relatively high numbers, they have declined by up to 90% over the last 100 years (McLennan 1996) and their current status remains in serious decline due to poor recruitment and loss of adult birds. This is largely a consequence of predation, particularly by dogs and stoats.

An important step in the recovery of all kiwi taxa is to provide sustainable protection from key threats for a minimum number of pairs, while other recovery efforts continue or are implemented. Such 'security populations' need to be of sufficient size to provide confidence that a taxon will not become extinct in the medium term. The Kiwi Recovery Plan has identified a target of 500 breeding pairs as a minimum goal for each taxa. This goal has already been achieved for Northland brown kiwi with more than 500 breeding pairs under sustained management and secure from threats, other than dogs, in the Whangarei Kiwi Sanctuary, other large community management areas and offshore islands. Enhancing and sustaining these populations is the current challenge (Pierce *et al.* 2006).

Issues

- A minimum secure population of 500 breeding pairs already exists for Northland brown kiwi and yet the population remains in decline.
- Continuous forest or mixed forest/scrub and farmland habitat, ideally between 1,000 and 2500ha could potentially accomodate 500 pairs if all components were well managed. Therefore most of the 38 known management sites in Northland could potentially support populations of 500+ pairs (Pierce *et al.* 2006).
- Realising 500 protected pairs at each management site is unrealistic due to limited funding, resources and technical input.
- Northland taxon plan should be aiming for a considerably higher minimum secure population than the 500 recommended in the Kiwi Recovery Plan.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 9.1: To secure a minimum of 500 pairs of brown kiwi (all taxa), great spotted kiwi and Fiordland tokoeka from the relevant agents of decline Note: It is assumed that the current effort for these taxa will not decline, i.e. the majority of projects will continue or increase their efforts throughout the term of the plan.

Taxon Plan Objective(s)
Objective 7.1: To secure a minimum of 1600 breeding pairs of Northland brown kiwi within four

management areas (i.e. 400 pairs per site) under sustained permanent protection.

Objective 7.2: To secure an additional six sites each with populations between 50 and 200 pair.

Objective 7.3: To secure an additional 15 sites under effective management for kiwi throughout the known and historical range of Northland brown kiwi and work towards expanding those areas with ecological linkages .

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Control relevant pests (stoats, ferrets, dogs and cats) at all managed sites with populations above 200 pairs, and 30% of sites with populations between 50 and 200 pairs where management is based on BNZ Operation Nest Egg only (brown kiwi, great spotted kiwi and tokoeka) by 2018	9.1	Conservators	High
Maximise effectiveness and efficiency of predator control at currently managed sites through review of existing management and/or increase in effort by 2010 and then throughout the term of the plan	9.2	Conservators	High

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
7.1	Identify four sites where a minimum of 400 breeding pair of Northland brown kiwi can be secured per site within the next 10 years.	2010	Essential	Northland Kiwi Forum
7.2	Have a minimum of 1600 breeding pairs of kiwi secure in a minimum of four managed sites.	2019	Essential	DOC/Northland Kiwi Forum
7.3	Identify and secure at least six sites where between 50 and 200 breeding pair are currently present and where populations can be doubled within the next 10 years of plan.	2010	Essential	DOC/Northland Kiwi Forum Northland Conservator
7.4	Populations are doubled within each of the six sites identified in Action 7.3.	2019	Essential	DOC/Northland Kiwi Forum
7.4	Have at least 1000 breeding pairs of kiwi secure across a minimum of six additional managed sites.	2019	Essential	DOC/Northland Kiwi Forum Northland Kiwi
7.5	Idenitfy and secure a minimum of 15 additional sites under effective management and work towards expanding those areas with linkages.	2013	Essential	DOC/Northland Kiwi Forum
7.6	Work closely with existing and future community based projects to achieve the above.	Throughout	Essential	DOC/Northland Kiwi Forum

5.1.8 Topic 8: Overall regional declining populations

Background

All four North Island brown kiwi taxa remain threatened with annual decline recorded as high as 5.8% in some areas (McLennan *et al*. 1996). Recent data indicates that for Northland brown kiwi populations, this may be closer to 2% (H. Robertson, DOC, unpubl. data). Where populations of Northland brown kiwi are under secure protection, annual increases of up to 9% have been recorded. However these populations are dispersed with many scattered and isolated birds. Only about 20% of Northland birds are currently under management and their increase approximately equals the assumed decline in the unmanaged populations (Holzapfel *et al*. 2008). This has resulted in the continued overall decline of this taxon.

If specific population clusters can be managed at or near carrying capacity they will produce chicks beyond the immediate recruitment needs of that population. These chicks or adults can then be translocated to other sites to establish new or enhance existing populations. These breeding populations are known as kohanga kiwi.

Issues

- Despite local population stability or increases at managed sites, Northland brown kiwi are still declining overall.
- Potential and actual carrying capacity of Northland brown kiwi is poorly understood.
- There is currently no management strategy that addresses management of scattered isolated birds.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 10.1: To manage a sufficient proportion of the population of brown kiwi (all taxa), great spotted kiwi and Fiordland tokoeka to ensure that the net rate of loss for each taxon over the whole population is zero.

Taxon Plan Objective(s)
Objective 8.1: To manage a sufficient proportion of the Northland brown kiwi taxon to ensure that overall population decline is halted and recruitment exceeds mortality.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**

Apply landscape-scale pest control at sufficient intervals at the sites with greatest potential gain, i.e. largest number of currently unmanaged kiwi (brown kiwi, great spotted kiwi and Fiordland tokoeka).	10.1	Conservators	High
Establish new and enhance existing projects, including those utilising BNZ Operation Nest Egg, to increase local population abundance to the point where the population can be used as kohanga kiwi, a source for other sites (brown kiwi, great spotted kiwi and Fiordland tokoeka)	10.2	Conservators	High

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
8.1	Apply landscape-scale integrated pest control at sufficient intervals at the sites with greatest potential gain, i.e. largest number of Northland brown kiwi that may or may not be receiving some sort of management effort. As per section 7.0 – 21 additional sites described in 7.3 and 7.5	Throughout from	Essential	DOC / Northland Kiwi Forum and Kiwi Projects
8.2	Establish two additional Northland kohanga kiwi sites within the existing and or former range of the Northland brown kiwi.	2013	High	DOC
8.3	Develop a consistent approach for managing or translocating scattered and isolated kiwi.	2010	Medium	DOC / Northland Kiwi Forum

5.1.9 Topic 9: Distribution and genetic diversity

Background

Understanding genetic variability and distinctiveness is critical to effective conservation management. Genetic variability is important to the health of a population because a loss of variability can lead to inbreeding and reduced fitness; resulting in poor species health, lowered levels of fertility and the inability to respond to environmental change and disease. This can ultimately lead to extinction.

The continued decline of Northland brown kiwi is likely to result in a further contraction of their distribution, and the isolation of population clusters, which in turn can result in a loss of genetic diversity. Existing natural and artificial barriers to dispersal are also exacerbating loss of genetic variability by limiting gene flow throughout the Northland region (Pierce *et al.* 2006).

Island populations face genetic bottlenecking pressures, particularly if the founder population was small. All island populations remain critical to the survival of Northland brown kiwi as they provide secure populations should there be an

ecological disaster or extinction on the mainland. Thus it is important to maintain the genetic variability of these populations.

Maintaining or enhancing the distribution of Northland brown kiwi populations and the preservation of their genetic variation is of lower priority compared to other recovery objectives in this taxon plan, however it is encouraged if opportunities present themselves, e.g. as part of wider site restoration objectives. A precautionary principle should be applied in the management of the population until the genetic status is fully understood.

It is also noted that further genetic analysis is required to resolve the level of distinctiveness of the North Island brown kiwi populations to confirm these conservation management units.

Previous translocations have established populations of brown kiwi outside their natural geographic range. This includes offshore islands with mixed-provenance populations such as Ponui Island, which is a mix of Taranaki (ex-Hauturu/Little Barrier Island) and Northland birds. Establishment of new populations within the extent of their former range on the mainland is an objective of this taxon plan. Maintaining genetic diversity is an important consideration when undertaking translocations and establishment of new populations.

Issues

- There is a continued reduction in the distribution of the Northland brown kiwi taxon.
- The genetic integrity of the taxon needs to be managed and maintained.
- Fragmented habitat and natural and artificial barriers are limiting the dispersal and thus natural genetic movement of Northland brown kiwi throughout the region.
- The genetic analysis of all North Island brown kiwi *Apteryx mantelli* requires further work to conclusively resolve the taxonomy of the distinct taxa.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 13.1: To manage kiwi over as large a part of their historical range as possible.
RP Objective 13.2: To maintain genetic integrity within species at the appropriate scale.

Taxon Plan Objective(s)
Objective 9.1: To manage Northland brown kiwi over as large a part of their historical range as possible.
Objective 9.2: To maintain the genetic integrity of the taxon.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Identify in taxon plans opportunities for the establishment of new populations within the historic range of the taxon in 2009	13.1	Taxon plan lead conservators	High
Optimise low-level, landscape-scale management undertaken for non-kiwi-specific goals to benefit kiwi over their current distribution by 2012 and then throughout the term of the plan	13.2	Area managers / conservators	High
Manage currently recognised taxa within species as separate conservation management units, except in recognised mixed-provenance zones, throughout the term of the plan	13.3	Area managers / conservators	High
Manage populations within recognised taxa as much as feasible to maintain fine-scale diversity by minimising translocations between geographic extremes and natural boundaries throughout the term of the plan	13.4	Area managers / conservators	Medium

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
9.1	Identify a minimum of two reintroduction sites within the former extent of the Northland brown kiwi range from which they are presently extinct. Potential reintroduction sites include the Brynderywn-Mangawhai area, Shakespeare Park, Waitakere Ranges, and Te Paki (Pierce *et al*. 2006) Also intensively managed areas where kiwi have recently disappeared. Note: Same as action 3.1, section 5.3.1	2010	Medium	DOC/Northland Kiwi Forum / Kiwi Recovery Group
9.2	When kiwi are secure in viable populations at several locations within their current range, reintroduce kiwi to former parts of their historical range.	2019	Medium	DOC/Northland Kiwi Forum / Kiwi Recovery Group
9.3	Develop a long-term strategy for the establishment of local and regional corridors to enable gene flow across large parts of the Northland population (Pierce *et al*. 2006) Note: Same as actions 3.2 and 3.3, section 5.1.3)	2019	High	DOC/Northland Kiwi Forum
9.4	To support and or undertake further detailed surveys to conclusively identify the true extent of the Northland taxon distribution.	2013	Medium	Research & Development Group

9.5	To support research into the taxonomy of the Northland taxon of *Apteryx mantelli*.	2013	High	Research & Development Group
9.6	Develop an island strategy for the management of island populations to prevent bottlenecking / saturation. Note: Same as action 5.1, section 5.1.5	2011	Medium	DOC/Northland Kiwi Forum
9.7	Swap and/or introduce new kiwi into closed populations to increase the gene-pool and address any bottlenecking. Note; Same as 3.10 and 5.3	2013	Medium	Doc, kiwi projects

5.1.10. Topic 10: Mixed-provenance populations

Background

Ponui Island contains a population of mixed-provenance Northland and Taranaki birds. The Wildlife Service established the population in the 1960's in the days before genetics and population variances were understood. The population is currently thought to have reached saturation, which is evident in the high density and relatively poor condition of the birds.

The management of this mixed-provenance population is complex due to the underlying principle that requires genetically distinct populations to be managed as unique conservation units. Where can excess mixed-provenance birds be translocated if there is a risk to the genetic purity of the mainland populations? The question then is what to do with the Ponui birds? What risks and opportunities do they present? Are they left to their own demise or are their opportunities for establishing mixed-provenance populations on the mainland in areas where naturally occurring provenance boundaries would have intersected?

At present the known distribution of Northland brown kiwi, with the exception of Tawharanui Open Sanctuary, and small remnant pockets near Warkworth, is limited to areas north of the Brynderwyn Range. Taranaki brown kiwi are found from Maungatautari southwards. There is a distance of over 250km between these areas that presently does not contain any confirmed populations of brown kiwi and if there are birds present their numbers are very low. Therefore what are the risks to the 'pure' mainland populations should a mixed-provenance population be established somewhere within this area?

Issues

- The mixed-provenance population on Ponui Island has likely reached carrying capacity (R.Colbourne pers. comm.).
- Relieving the population on Ponui Island would strengthen the genetic diversity and health of this population.

- There is debate about the establishment of mixed-provenance populations on the mainland using birds sourced from Ponui Island.
- The naturally occurring mixed-provenance zones are not known. Where did the Northland, Coromandel and Taranaki taxon boundaries meet, if at all?
- If some kiwi are translocated from Ponui to protected sites around Auckland what are the chances of them dispersing to meet genetically 'pure' mainland populations?
- The risks of establishing a mixed-provenance mainland population should be assessed and weighed against opportunities.
- There are significant issues for iwi surrounding mixed-provenance populations.
- The translocation of mixed-provenance birds to areas around Auckland will increase distribution and establish another major kiwi zone.
- Do the Ponui birds warrant the investment of funds that would otherwise be spent on 'pure' mainland populations?.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 13.3: To integrate mixed-provenance populations into the national recovery framework for kiwi, using them as source populations for translocations and designating 'mixed-provenance zones', i.e. areas between existing taxon boundaries where mixing between two taxa could have occurred naturally.

Taxon Plan Objective(s)
Objective 10.1: To answer the questions regarding management of the Ponui Island population and if appropriate use them as a source population for translocation to designated mixed-provenance zones.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Manage currently recognised taxa within species as separate conservation management units, except in recognised mixed-provenance zones.	13.3	Area managers / conservators	High
Prepare a full list of mixed-provenance populations, their history and options for continued management (including inclusion in relevant taxon plan(s) and their potential as source or receiving populations for translocations) by 2010.	13.7	Recovery Group	Medium

Taxon Plan Actions required to achieve objective(s)

#	Action	Timeframe	Priority	Accountability
10.1	Establish a management plan for the Ponui Island mixed-provenance birds, addressing both short-term and long-term implications for this population. This should be considered as part of a national mixed-provenance plan.	2011	High	Kiwi Recovery Group DOC, Northland Kiwi Forum/landowners
10.2	Identify areas where mixed-provenance zones may have naturally occurred.	2011	High	Kiwi Recovery Group
10.3	Address the management plan for the Ponui Island birds, as determined by the Kiwi Recovery Group, in the taxon plan review. Note: To be included in both the Northland and Taranaki taxon plans.	2013	Essential	DOC/Northland Kiwi Forum, landowners

5.1.11 Topic 11: Captive Management

Background

Ex-situ and captive management has been critical to the increase in scientific knowledge of kiwi, and advocating for the species and their conservation. This management enables the development of skills in captive husbandry and the implementation of programmes such as BNZ Operation Nest Egg™, which would not be possible without the involvement of captive institutions.

Up until 2008, captive breeding has almost exclusively focused on North Island brown kiwi. However, many of the skills and techniques developed have been transfered to other more threatened species. Offspring from captive facilities have mainly been used in existing or new captive programmes, though some release into the wild has occurred (Holzapfel 2008). BNZ Operation Nest Egg™ sub-adults are returned to the wild.

Captive institutions are a component in the recovery of kiwi and play an important role in kiwi advocacy by providing an opportunity for the general public to view live kiwi and understand their conservation needs. Whangarei Museum and Whangarei Native Bird Recovery centre are the only captive facilities currently present within the natural range of the Northland brown kiwi. Only the Whangarei Native Bird Recovery Centre is involved in captive rearing for BNZ Operation Nest Egg™.

Captive institutions holding kiwi must have permits from DOC and are guided by the Captive Management Plan (KCMAC & DOC 2004) and the Brown Kiwi Husbandry Manual (Fraser & Johnson 2009). The latter document has been prepared for all institutions holding North Island brown kiwi in captivity. It reflects the collective experience of many individuals and organisations that have held kiwi in captivity over the past four decades, and seeks to document current best practice in husbandry of captive kiwi.

Issues

- Ensuring the advocacy messages from captive institutions are consistent with other messages.
- Optimising the visitor experience.
- Best practice is communicated and accepted by the industry.
- Captive institutions and kiwi projects can increase communication and opportunities to work together.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 15.1: To ensure that captive management supports key recovery planning objectives for all kiwi taxa.

Taxon Plan Objective(s)
Objective 11.1: To optimize the role the captive industry has in Northland brown kiwi recovery.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Review the captive management plan by 2009 (and 5-yearly thereafter) to ensure linkage with the recovery plan and taxon plan objectives, including the identification of capacity requirements (BNZ Operation Nest Egg, public viewing opportunities, crèche sites)	15.3	Recovery Group / Research and Development Group / ARAZPA	Essential
Report on progress towards captive management plan objectives, and provide recommendations annually to the Recovery Group and captive holders throughout the term of the plan	15.4	Recovery Group / ARAZPA	Medium

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
11.1	Representatives from Northlands captive facilities are actively involved in the recovery of the taxon and are included in the Northland Kiwi Forum.	Throughout	Essential	Northland Kiwi Forum
11.2	Captive institutions continue to apply the methods of best practice.	Throughout	Essential	Northland Conservator / Captive Institutions

5.1.12 Topic 12: BNZ Operation Nest Egg™

Background

BNZ Operation Nest Egg™ was developed in 1994 using funding from the Bank of New Zealand. It has since become a powerful tool for kiwi recovery and is considered to be the fastest way of restoring depleted kiwi populations. It is widely used, particularly amongst North Island brown kiwi taxa, for establishing new populations, supplementing existing populations and maintaining recruitment in years when conventional predator control techniques fail to give adequate protection of young (Colbourne *et al*. 2005). Nationwide there are six captive facilities involved with a large number of community and DOC-led programmes.

BNZ Operation Nest Egg™, and a variation of the technique that removes chicks from the natal burrow, result in egg and chick survival rates that are significantly higher than in the wild. This is achieved primarily through two means: increasing hatching success by eliminating threats to eggs such as nest desertion, predation and bacterial infection; and improving chick survival by removing them from the risk of predation (Colbourne *et al.* 2005).

While BNZ Operation Nest Egg™ benefits kiwi, it has a neutral effect on the rest of the ecosystem; having neither positive nor negative effects (Colbourne *et al.* 2005). It also has a high cost and labour requirement, which makes it less economical than other tools for management of larger populations. The comparison of cost versus benefit of BNZ Operation Nest Egg™ versus predator control is not widely understood. The challenge for current and future kiwi recovery is increasing the level of ecosystem management for the benefit of all species and habitats.

For Northland brown kiwi most population clusters have moderate to high kiwi numbers, and when given adequate protection from predators, survival and productivity rates are sufficient to enable a population increase (Pierce *et al*. 2006). As described by Pierce *et al*. 2006, more cost-effective alternatives to standard BNZ Operation Nest Egg™ procedure could be utilised. This includes a technique that has already been used successfully in Northland which involves allowing chicks to hatch in the wild, radio-tagging these chicks at the nest, and then transferring to a crèche once they have reached the age at which they can become independent in the wild (10-20 days old). This method bypasses the use of a captive hatching facility, thus is less costly. Another option which has only been tried on a few occasions is to translocate juvenile and adult kiwi that are under threat from vulnerable to managed sites. There are indications that these birds are unsettled and will disperse long distances from their release sites (Wendy Sporle *pers comm*.)

Despite the financial cost of BNZ Operation Nest Egg™, the benefits to kiwi recovery have been well demonstrated and the positive advocacy opportunities it provides are immense. As it directly involves the handling of kiwi it creates situations where community and landowner groups can fully engage with kiwi, being present during egg and chick retrieval and release. This is significant as being able to see a live wild kiwi significantly enhances the desire to help in its recovery. The use of BNZ

Operation Nest Egg™ and chick translocations used as an advocacy tool has proven to be excellent for building critical conservation linkages with DOC, tangata whenua, local schools, local communities and captive-breeding institutes, and is an excellent vehicle for highlighting threats to kiwi in the media (Robertson *et al.* 2003).It is also a valuable tool when advocating dog control messages.

Northland brown kiwi Operation Nest Egg™ chicks are hatched at the Auckland Zoo and Whangarei Native Bird Recovery Centre. They are then transferred to one of two island crèches: Matakohe/Limestone Island in Whangarei Harbour or Motuora Island in the Hauraki Gulf. Both of these crèche sites have huge community input and are managed by community-led supporters trusts (Friends of Matakohe Limestone Island Society (FOMLI) and the Motuora Restoration Society), with support from DOC and BNZ Save the Kiwi Trust.

A national long-term plan for BNZ Operation Nest Egg™ and how it supports the kiwi recovery plan is lacking although there is currently a BNZ Operation Nest Egg™ Best Practice Manual (Basset 2009 *in press*) in a draft stage.

Issues

- National data on the use and success of BNZ Operation Nest Egg™ is not available.
- The use of BNZ Operation Nest Egg™ lacks national coordination.
- The use of BNZ Operation Nest Egg™ is expensive.
- Though BNZ Operation Nest Egg™ does not degrade the habitat it's use doesn't benefit other species. so funding may be better spent on predator control and habitat corridors.
- Direct translocations of chicks, juveniles and adult kiwi from a vulnerable site to a managed site may be a more cost effective technique than full BNZ Operation Nest Egg™.
- There is currently no plan for the number of crèche sites or the number of incubation facilities required (Holzapfel *et al*. 2008).
- The use of BNZ Operation Nest Egg™ has potential advocacy gains that also need to be considered.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 17.1: To ensure that the use of BNZ Operation Nest Egg™ is effective and undertaken to sufficient standard.

Taxon Plan Objective(s)
Objective 12.1: To ensure that the use of BNZ Operation Nest Egg™ is used effectively and undertaken to sufficient standard in the recovery of the Northland brown kiwi taxon.

Objective 12.2: To safely manage and optimize the advocacy opportunities BNZ Operation Nest Egg™ provides.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Review protocols for all components of BNZ Operation Nest Egg™, including the development of minimum standards as part of best practice, by 2009 and update biennially	17.1	Recovery Group/ Captive Coordinator/ ARAZPA	Essential
Initiate national coordination for the collection and reporting of data on the use of BNZ Operation Nest Egg™ by 2009	17.2	Recovery Group/ Captive Coordinator/ ARAZPA	Medium
Develop guidelines for when and where to use BNZ Operation Nest Egg™ instead of, or in conjunction with, other tools by 2010	17.3	Research and Development Group	High
Develop a 10-year plan for BNZ Operation Nest Egg™, including number and location of incubation facilities and crèche sites, by 2010	17.4	Recovery Group/ Captive Coordinator/ ARAZPA	High

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
12.1	Apply guidelines for when and where to use BNZ Operation Nest Egg™ to the management strategies for Northland brown kiwi.	From 2010	High	Northland Kiwi Forum
12.2	Provide recommendations to the development of a 10-year plan for BNZ Operation Nest Egg™, including number and location of incubation facilities and crèche sites, by 2010	2010	High	DOC/Northland kiwi Forum
12.3	Support the safe use of BNZ Save the Kiwi Operation Nest Egg™ advocacy opportunities as part of a project's management tools but not kiwi handling for advocacy purposes alone	Throughout	Medium	DOC/Northland kiwi Forum

5.1.13 Topic 13: Kiwi crèches and kohanga kiwi

Background

Kiwi crèche is a term used for an intensively managed predator free area where chicks that have been hatched in captivity under BNZ Operation Nest Egg™, can safely grow to a weight where they are more able to resist stoat predation. When they reach more than 1200gms in weight they can be captured for re-release onto

the mainland. There are two crèche sites for Northland brown kiwi these are; Matakohe/Limestone Island and Motuora Island.

Kohanga kiwi is a site where intensive management allows kiwi populations to establish in size to a point where carrying capacity may be reached. This enables the population to act as a source for translocation to other sites to either supplement existing populations or establish new ones. There is currently one kohanga kiwi sites for Northland brown kiwi, at Whangarei Kiwi Sanctuary. Further kohanga kiwi sites are proposed by Tawhiranui Open Sanctuary, Whakaangi Landcare Trust and the Whangarei Heads Landcare Forum.

Issues

- There is no strategic direction or plan for the number and location of kiwi crèche and kohanga kiwi sites.
- The identification or creation of suitable crèche sites has been largely uncoordinated, driven by local need rather than through regional or national planning. As such kiwi crèche have grown in an ad hoc manner.
- Crèche demand will fluctuate.
- Areas under management where there are low densities of kiwi could benefit from the addition of translocated kiwi to increase genetic diversity and kiwi numbers.
- New populations are being planned throughout Northland and the greater Auckland region. Crèches and kohanga kiwi will be required.
- It will take time to establish kohanga kiwi.
- There are no kohanga kiwi currently established within the northern part of the region to be a source population for Far North projects.
- There is a need to ensure that each proposed kohanga kiwi management site is adequately supported in terms of resourcing and technical input.

Objective(s) and Actions

Recovery Plan Objective(s)
RP Objective 17.1: To ensure that the use of BNZ Operation Nest Egg is effective and undertaken to sufficient standard.

Taxon Plan Objective(s)
Objective 13.1: To maintain adequate crèche capacity in Northland
Objective 13.2: To investigate the establishment of two further kohanga kiwi sites, one in upper Northland and one in lower Northland.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action #**	**Accountability**	**Priority**

	(KRP)		
Develop a 10-year plan for BNZ Operation Nest Egg, including the number and location of incubation facilities and crèche sites, by 2010	17.4	Recovery Group / captive coordinator, ARAZPA	High

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
13.1	Develop a strategic plan for the number and location of kiwi crèche and kohanga kiwi for Northland brown kiwi. Ensure that this correlates with the 10-year BNZ Operation Nest Egg Plan due in 2010.	2011	High	DOC /Northland Kiwi Forum
13.2	If required, establish and maintain two further kohanga kiwi in Northland to provide opportunities to strengthen or re-establish Northland kiwi populations. Note: Same as action 8.2, section 5.1.8	2013	High	DOC
13.3	Maintain at least one crèche site for the taxa	Throughout	Essential	DOC, Kiwi Recovery Group

5.2 Community relations and engagement

Recovery and protection of Northland brown kiwi relies on the interest, understanding, engagement and collaboration of many sectors of the community. The particularly strong association of the Northland community with kiwi presents both opportunities and challenges. Realising these opportunities will have a strong influence on the outcome of this plan and the future of kiwi in the wild.

Many Northland brown kiwi are present on privately owned land. The threats to kiwi survival are human induced, and yet the means for their survival is also dependent upon positive human activities to control predators and protect and restore habitat.

Numerous community and landowner-led kiwi conservation projects have been established within the range of Northland brown kiwi. Their achievements in the past eight years have secured kiwi numbers within the project areas. The long term sustainability of these projects presents challenges and these groups and individuals face tremendous battles to maintain the energy, enthusiasm and funding to sustain their protection efforts; despite support from DOC and BNZ Save the Kiwi Trust, NZ Landcare Trust, NZ Kiwi Foundation and other organisations.

There still remains a large sector of society that are unaware of the vulnerability of kiwi, their presence, and the effect human actions may have on the survival of

individuals and population clusters. There is still an immense amount of work to do to educate, support and engage the public in the recovery of Northland brown kiwi.

In general there is a four staged progression to actively involving people in kiwi recovery:

1. Awareness of kiwi and their threats
2. Learning to care about kiwi and the environment
3. Wanting to make a difference
4. Empowerment and taking action to actually make a difference

Positive community relations and engagement in kiwi recovery is much more than just raising awareness, it involves providing the support and tools with which people can really get involved.

5.2.1 Topic 14: Advocacy

Background

The recovery and establishment of sustainable populations of Northland brown kiwi is dependent on the collective effort of all agencies and people involved with kiwi and their habitat. The Department of Conservation certainly cannot do it alone, and as funding and resources reduce, the importance of community and landowner-led protection efforts increases. Advocacy will continue to be an important component of Northland kiwi recovery by helping to ensure broader public support and engagement, and by generating funding and resources.

Northland brown kiwi advocacy has progressed from raising awareness to facilitating joint protection efforts between the Department of Conservation, tangata whenua, communities, landowners, agencies and organisations. It includes sharing information, promoting specific issues and solutions, and increasingly assisting community groups with the establishment of their own habitat protection and advocacy programs.

Advocacy is considered to be a major tool for addressing dog control and the high incidents of dog predation of kiwi in Northland. Advocacy targets include the general public, iwi, interest groups and statutory authorities.

Issues

- A wide variety of groups and individuals are now involved in some form of kiwi advocacy. It is important that the issues and solutions for kiwi are well understood to ensure consistency of the advocacy message.
- Kiwi recovery is dependent upon engaging and motivating people to become actively involved.

- The effects of dog predation on kiwi is a major issue in Northland, there is a need for innovative advocacy to contribute toward solving the dog issue.
- Having a kiwi experience enhances individual commitment to making a difference for kiwi. These kiwi experiences need to be facilitated and managed in a positive way for kiwi and people.
- Northland tourism operators are an under utilised advocacy source and a potential for revenue generation for kiwi projects. They are keen to explore the eco-tourism potential for Northland brown kiwi in a manner that benefits the recovery of the taxon.
- The support and commitment of statutory authorities is critical to minimizing the effects of people, their pets, development, land modification and dog control on kiwi populations. They are also another important source of potential kiwi advocates.
- There is a need to understand how to communicate and work with all agencies and people (Department of Conservation permits, requirements etc)
- Forestry companies have the potential to advocate and train contractors to apply practices safe for kiwi.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 18.1: To increase awareness and support for kiwi protection through the provision of high quality advocacy for kiwi projects at all levels.

Taxon Plan Objective(s)
Objective 14.1: To motivate and empower people to make a positive difference for kiwi.
Objective 14.2: To develop and apply innovative ideas to advocate dog control messages and methods which will reduce the impact of dogs on kiwi.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Coordinate advocacy nationally, including the development of resources and provision of advice, through a National Mentor for Kiwi Advocacy throughout the term of the plan.	18.1	Recovery Group / BNZ Save the Kiwi Trust	Essential
Establish a regional support structure for local kiwi projects, including for advocacy, by 2010 and maintain this through the term of the plan	18.2	National Mentor for Kiwi Advocacy	High
Develop an advocacy section in each taxon plan that outlines methods and tools by 2009	18.3	Taxon Plan lead Conservators	Essential

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
14.1	Continue to encourage people to become actively involved in kiwi protection and facilitate kiwi projects to establish their own advocacy programs.	Throughout	Essential	National Mentor for Kiwi Advocacy
14.2	Each kiwi project advocate will become part of the national advocacy structure.	From 2010 Throughout	High	National Mentor for Advocacy
14.3	Produce a regular newsletter to be distributed to all kiwi projects and interested stakeholders. Note: Same as action 2.5, section 5.1.2	Annually	High	Northland Kiwi Administrator
14.4	Provide a regular kiwi hui for the sharing of information and best-practice workshops. Note: Same as action 2.4, section 5.1.2	Bi annually	High	Northland Kiwi Forum / DOC/ Northland kiwi administrator
14.5	Identify at least 2-3 sites in Northland where kiwi practitioners / and selected tourism operators can provide kiwi experiences.	2010	Medium	DOC /Northland Kiwi Forum
14.6	Establish a Northland brown kiwi taxon website for the sharing of information and advocacy ideas. Note: Same as action 2.7, section 5.1.2	2010	Medium	Northland Kiwi Administrator
14.7	Network with BNZ Save the Kiwi National Mentor for Advocacy for ideas and resources. These are to be circulated amongst projects and promoted on website.	Throughout	High	Northland Kiwi Administrator
14.8	Establish and implement a dog control advocacy program throughout the range of Northland brown kiwi.	From 2010 throughout	Essential	DOC /Northland Kiwi Forum
14.9	Test dog advocacy, control solutions and ideas within the Whangarei kiwi sanctuary, which can then be applied elsewhere.	From 2010 throughout	Essential	Northland Conservator
14.10	Ensure that aversion training workshops optimise the advocacy opportunity. Have handout material available.	Throughout	Essential	DOC
14.11	Develop and deliver kiwi pack for statutory authorities and update as required. (Delivery by project advocates).	2010	Essential	DOC /Northland Kiwi Forum
14.12	To support or undertake research into the eco-tourism potential and opportunities with Northland brown kiwi.	2013	Medium	DOC /Northland Kiwi Forum

5.2.2 Topic 15: Tangata whenua

Background

Tangata whenua have a unique relationship with kiwi that is interwoven with genealogy and tradition. In Maori mythology it is believed that people, birds and trees are all descendents of Tane the god of the forest and therefore distantly related (Orbell 2003). The kiwi is thought to be the eldest of all Tane's children and as such great ceremony and reverence was placed upon any historical harvest and use of kiwi.

As kaitiaki (guardians) of the natural world, tangata whenua are intrinsically interested in the protection and recovery of kiwi populations. Tangata whenua are involved in some capacity in most Northland brown kiwi projects. As kiwi are present on Maori owned and administered lands, some iwi groups have established, or are in the process of establishing, their own kaitiaki and kiwi protection projects. These include intensive pest control, habitat restoration and advocacy efforts. The support of tangata whenua in habitat protection programs and advocating dog control for kiwi protection is vital.

Issues

- Involvement by tangata whenua in aspects of kiwi management is variable across Northland, with more opportunities present than have been utilized.
- The role of iwi in kiwi recovery planning and implementation, and access to cultural materials is not always understood or given effect to.
- Predator control is being undertaken by tangata whenua at Motatau and Waima for other species and kiwi are benefiting by this work. Tangata whenua at Takou Bay have a kiwi project. Several others have expressed interest in establishing some.
- There is support for kiwi to be reintroduced to areas within their historical range, including in some rohe where Northland brown kiwi are now presumed extinct (Aupouri, Te Paki, southern Northland).
- Tangata whenua have an important role to play in the advocacy of dog control and kiwi protection.
- Advocacy is best carried out by local people in culturally appropriate ways
- A large number of iwi groups are present throughout the current and historical range of Northland brown kiwi. The inclusion of tangata whenua in the Northland Kiwi Forum is critical.

Objectives and Actions

Recovery Plan Objective(s)

RP Objective 19.1: To ensure that iwi are involved at all levels of kiwi management and research in an interactive way and in a way appropriate to all parties' commitments and expectations.

Taxon Plan Objective(s)
Objective 15.1: To encourage the increased involvement of tangata whenua in all levels of kiwi management and research within the extent of the Northland brown kiwi.
Objective 15.2: To support new iwi led initiatives to actively protect kiwi.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Involvement of tangata whenua in the development and implementation of taxon plans throughout the term of the plan.	19.1	Taxon Plan lead Conservators	Essential
Identify opportunities and current barriers for the involvement of tangata whenua in kiwi recovery throughout the term of the plan	19.2	Area Managers / Conservators	Essential
Ensure that agreed processes for involvement of tangata whenua in kiwi management are observed throughout the term of the plan	19.3	Area Managers / Conservators	Essential

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
15.1	To support existing and new initiatives in iwi led kiwi protection projects where this aligns with the overall Northland strategy detailed within the taxon plan.	Throughout	Essential	DOC / Northland Kiwi Forum
15.2	Establish a Northland iwi mentor. The Iwi mentor will assist interested tangata whenua in establishing their own advocacy programs and will work with the Kiwi administrator.	2010	Essential	DOC / BNZSKT /Northland Kiwi Forum
15.3	Identifying iwi kiwi champions to advocate and encourage kiwi recovery. At least one per DOC area	2011	High	Northland Iwi Mentor / DOC
15.4	Increase tangata whenua involvement in kiwi monitoring	Throughout	High	Northland Iwi Mentor/ Northland Kiwi Forum
15.5	Northland brown kiwi hui to be held bi-annually and moved around Northland region with specific iwi invitations. (Note: same as action 2.4, section 5.1.2)	biannually from 2010	High	DOC /Northland Kiwi Forum

15.6	Advocacy and aversion training on marae – one per rohe. Aim for a minimum of 12 sessions each year.	Annually	Essential	DOC

5.2.3 Topic 16: Community and landowner led initiatives

Background

Community and landowner led initiatives are a vital component of Northland brown kiwi recovery. In Northland the number and extent of projects being undertaken by private landowners, interest groups, trusts and tangata whenua surpass the effort able to be committed by the Department of Conservation.

The sustainable recovery of Northland brown kiwi is dependent upon the continued efforts of the wider community and the ability of these individuals and groups to access ongoing support. Support includes training and assistance with technical information and best practice; particularly in relation to habitat restoration, pest control and monitoring, access to resources and funding avenues, and administration and networking.

The extent of kiwi on privately owned lands and the proximity of kiwi to residential settlements are unique features of the Northland brown kiwi population. Pet-free subdivisions and a willingness to assist in active protection measures are also notable within communities throughout the Northland kiwi range.

An increasing profile and understanding of the issues surrounding Northland brown kiwi is leading to a considerable groundswell of support for their protection. Increasingly individual landowners are wanting to protect “their kiwi” and like larger community and landcare groups, they will also require support, even if their resident birds are not considered a priority population. It is important to harness and support individuals who embrace the idea of looking after their own land, kiwi and other indigenous species within it, no matter how small the site or remote the location. Unfortunately these smaller projects may not have access to all possible funding opportunities.

The allocation of funding is often based on a combination of factors including priority of population or management area, and the extent of community and individual support and commitment to undertaking the work.

Issues

Community led projects face a number of issues that endanger their long-term sustainability including:

- Working within a mainly annual grant structure and therefore a lessened ability for long-term planning.

- Workload being carried out mainly by volunteers, including aspects of strategic planning, funding and administration (e.g. translocation proposals) that are time consuming and require specialist knowledge and skills.
- Community and landcare groups often lack the capacity to access external funding providers and thus their actual potential cannot be realized. The sustainability of funding is a major issue.
- Kiwi practitioners do not always have good access to the latest information pertaining to kiwi recovery, e.g. best practice, land management techniques, priority sites for kiwi protection.
- There are increasing numbers of people wanting to help kiwi that is stretching the already limited pool of resources available.
- Landowners and community groups with small and isolated kiwi populations require support and inclusion.
- All projects require both initial and ongoing support during project set-up, training, monitoring and best practice information.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 20.1: To ensure that community involvement in kiwi protection is optimized, sustained and follows best practice.

Taxon Plan Objective(s)
Objective 16.1: To ensure that community involvement in Northland brown kiwi protection is optimized, sustained and follows best practice.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Provide regular opportunities to strengthen networks and information sharing among community-led projects, including regional/national meetings (kiwi hui) for kiwi practitioners and other stakeholders.	20.1	Recovery Group/BNZ Save the Kiwi Trust	Essential
Establish a regional support structure for local kiwi projects, including for advocacy, in 2010 and maintain this throughout the term of the plan.	20.2	National Mentor for Kiwi Advocacy	High
Provide regular suitable forums and training opportunities to share information on best practice, sustainability, strategic planning and funding for community-led initiatives	20.3	Recovery Group/BNZ Save the Kiwi Trust	Essential
Provide community groups with information on priority areas for management of kiwi by 2010 and then	20.4	Recovery Group/BNZ Save the Kiwi Trust/	High

throughout the term of the plan.		Taxon plan lead Conservators	
Include community groups, where applicable, in the development and implementation of taxon plans	20.5	Taxon plan lead Conservators	Essential

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
16.1	Establish the Northland Kiwi Forum to provide support and disseminate best practice information as required. Note: Same as actions 1.2 & 1.3, section 5.1.1 and action 2.2, section 5.1.2	2009	Essential	Northland Conservancy DOC / Northland Kiwi Forum
16.2	Northland Kiwi forum representatives meet twice a year at six monthly intervals to disseminate information through their networks. Note: Same as action 1.4, section 5.1.1.	Annually March and September	Essential	DOC/Northland Kiwi Forum
16.3	Establish a Northland Kiwi Administrator role. The purpose of this position is to assist kiwi projects throughout the region with accessing funding and support. This would alleviate some of the pressure on community groups to meet their administrative requirements. Note: Same as action 1.7, section 5.1.1	2010	Essential	DOC /Northland Kiwi Forum / BNZSKT
16.4	Provide a regular Northland brown kiwi taxon hui for the sharing of information and best practice workshops. Note: Same as action 2.4, section 5.1.2	Bi-annually	High	DOC /Northland Kiwi Forum
16.5	Encourage continued capacity with NZ Landcare Trust and Department of Conservation to support local kiwi projects	Throughout	Essential	DOC /Northland Kiwi Forum
16.6	Develop a Northland taxon website that is accessible to all groups and individuals working on the taxon. Note: Same as action 2.7, section 5.1.2	2010	Medium	Northland Kiwi Administrator

5.2.4 Topic 17: Statutory planning

Background

In some parts of their current distribution, Northland brown kiwi are found in close proximity to residential areas, in some cases living right amongst rural residential and lifestyle lots. This is largely a consequence of subdivision of peri-urban and rural lands. Kiwi are also sometimes present within forestry plantations and pasture.

Kiwi are vulnerable to the activities of people, not just those associated with the immediate clearance and development of land and farm forestry activity, but also ongoing lifestyle factors associated with residential areas. These include predation from domestic pets, noise and physical disturbance to areas of habitat, pollution, vehicle injuries, and other incidents where kiwi have fallen into swimming pools, cattle troughs etc.

Councils may not be aware of the extent of kiwi distribution or the issues relating to kiwi survival and how these relate to settlement and land development activities. As such inappropriate land development may be permitted or ineffective conditions of consent and planning regulations may be in place.

However there are also some examples where land development has provided an avenue, both financially and with incentives, for habitat enhancement and ongoing pest management to the benefit of kiwi and other indigenous species. Often this involves conditions of consent including covenants on the ownership and control of domestic pets, habitat restoration, and financial contributions of collective landowners to fund ongoing habitat management and predator control.

Many subdivision applications claim an intent to achieve such outcomes but often they do not, largely as a consequence of the inability of councils to enforce and effectively monitor conditions of consent. Where successful developments have been achieved it has been largely the result of genuine and committed developers, pet restrictions, a willingness of residents to buy into the ecological merits of the settlement, and support of organisations such as the NZ Kiwi Foundation and NZ Landcare Trust.

Subdivision and development in areas of kiwi habitat will continue to be sought, however some of the threats to kiwi can be addressed by statutory authorities via legislation, regulations, rules, incentives and policies. These can also apply to farming and forestry practices. Provisions of the Resource Management Act seek a balance of ecological, social, economical and community needs, thus identifying means by which kiwi and people can live in relative harmony is a critical objective of the taxon plan.

The sustainable management of Northland brown kiwi populations requires collaboration with planning authorities. They need to be aware of the distribution of kiwi, the issues surrounding their survival, and the methods by which they can assist in their recovery, so that they can address these where appropriate in their planning regulations and enforce these where applicable.

Issues

- Predation of kiwi by domestic animals, in particular dogs and cats, is likely to increase with further land development and is difficult to manage outside public conservation land.

- Land development has the potential to negatively impact upon kiwi habitat but can also provide opportunities for increased kiwi protection.
- There is a lack of collaboration between DOC and councils in relation to kiwi resource management issues.
- Councils need to be aware of the current distribution of kiwi and the issues and solutions for kiwi recovery.
- The capacity of councils to monitor conditions of consents needs to be addressed.
- The distribution and management of kiwi is irrespective of land tenure and council jurisdiction.
- Landowners with existing and potential kiwi habitat require incentives to protect, retain, and restore.
- Finding a balance between the needs of people and communities and kiwi is sometimes challenging.
- Kiwi practitioners and certified kiwi dogs need to be available to service the need for kiwi survey and location.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 22.1: To avoid, remedy or mitigate threats to kiwi and their habitat by promoting legislative and policy changes to statutory authorities.

Taxon Plan Objective(s)
Objective 17.1: To avoid, remedy or mitigate threats to kiwi and their habitat by promoting legislative and policy changes to statutory authorities.
Objective 17.2: To encourage and empower councilors and council staff to advocate for kiwi

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Raise awareness of kiwi threats associated with land use and how statutory planning and policy can support kiwi recovery	22.1	Area Managers/ Conservators/ BNZ Save the Kiwi Trust	High
Promote the inclusion of statutory protection of kiwi habitat and of kiwi from predation in district plans	22.2	Area Managers/ Conservators/ BNZ Save the Kiwi Trust	High
Provide local authorities with information on priority areas for management of kiwi	22.3	Area Managers/ Conservators	High

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
17.1	Local government inclusion in the Northland Kiwi Forum is encouraged.	2009 Ongoing	High	DOC
17.2	Provide a copy of this taxon plan to all councils and work with staff to apply it as appropriate.	2010	High	DOC / Northland Kiwi Forum
17.3	Develop a kiwi information pack for council staff that is relevant to the district and regional context.	2010	High	National Mentor for Advocacy / DOC
17.4	Include kiwi distribution maps in kiwi information packs and update regularly.	Every 5 years	Essential	DOC
17.5	Promote project relationships with councils	Throughout	High	Northland Kiwi Forum
17.6	Encourage council monitoring of consent conditions. Explore with Councils the possibility for the Northland Kiwi Forum or a designated representative to assist the council in monitoring certain conditions of consent where there is a direct impact upon kiwi populations.	Throughout	Essential	DOC /Northland Kiwi Forum Kiwi projects
17.7	Support consent conditions that establish no cat and dog clauses on subdivisions in high-density kiwi areas.	Throughout	High	DOC / Northland Kiwi Forum
17.8	Encourage subdivision requirements to design and implement habitat enhancement and predator control plans in or adjacent to areas of kiwi habitat.	Throughout	High	DOC / Northland Kiwi Forum
17.9	Identify opportunities to establish local and regional kiwi dispersal corridors and work with Councils to establish criteria and incentives within their framework to help see these realized.	2019	Medium	DOC / Northland Kiwi Forum
17.10	Work with Council's to develop innovative incentives to encourage landowners to retain, restore and protect areas of existing and potential kiwi habitat.	2013	High	DOC / Northland Kiwi Forum

5.2.5 Topic 18: Development of environmental standards - forestry

Background

Northland brown kiwi regularly utilise plantation forests as habitat. As such they are vulnerable to the numerous harvesting and maintenance practices that occur within these forest areas. Forest managers and owners thus have an important role to play in assisting with the recovery of Northland brown kiwi.

In 2007 the New Zealand Forest Owners Assocation developed an environmental code of practice aimed at anyone involved in forest management. It is designed to help forest managers, contractors and staff take into account the many factors that influence forest management and operations, including kiwi habitat (www.savethekiwi.org.nz).

In 2008, the Bank of New Zealand Save the Kiwi Trust, in collaboration with the Department of Conservation, Whakatane Kiwi Trust and Environment BOP, prepared 'Forestry Management Guidelines for North Island brown kiwi'. This is a very useful and practical guide for forestry managers to ensure that adverse effects upon kiwi populations within exotic forestry are minimized.

The application of the Code of Practice and the Forestry Management Guidelines to daily forestry activities, have the potential to play a major part in kiwi protection.

Issues

- Forestry and harvesting techniques are a significant issue for Northland brown kiwi who often inhabit plantation forests.
- Guidelines about kiwi specific issues have been produced but are not yet being adequately promoted to the rural production sector.
- Forestry managers have an important role to play in the recovery of Northland brown kiwi.
- The industry will require support and the services of kiwi practitioners to assist with their work.

Objective(s) and Actions

Recovery Plan Objective(s)
RP Objective 23.1: To optimize opportunities for kiwi protection on private production land through inclusion in appropriate environmental standards

Taxon Plan Objective(s)
Objective 18.1: To promote kiwi friendly forest management practices.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # KRP)**	**Accountability**	**Priority**
Provide information to certifying bodies for forestry, livestock farming and horticulture regarding kiwi biology, and protection methods, and promote their consideration in the development of standards and certification criteria	23.1	Area Managers/ Conservators/ BNZ Save the Kiwi Trust	Medium

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
18.1	Work alongside the industry, using the BNZ Save the Kiwi Forestry booklet, to encourage and train managers, owners and contractors to adopt kiwi safe silvicultural practices in exotic forests.	Throughout	Essential	National Mentor for Advocacy/ Northland Kiwi Forum/DOC
18.2	Include key forestry representatives in the Northland Kiwi Forum.	2010 and throughout	High	DOC /Northland Kiwi Forum
18.3	Refer foresters to the Department of Conservation Bay of Islands Area office forestry research and/or to kiwi practitioners able to help management.	Throughout	Medium	DOC / Northland Kiwi Forum and advocates
18.4	Ensure there are kiwi practitioners (and certified dogs) available to service the needs of the industry. This includes kiwi survey, handling and translocating where required.	2010 and throughout	Essential	DOC
18.5	Encourage forestry owners and staff to avoid taking dogs into kiwi areas but if they must that the dogs be given kiwi aversion training.	Throughout	Essential	DOC
18.6	Establish a 'kiwi friendly' logo and accreditation system much like a certified organics for forestry activities. In light of increasing demand for sustainable forestry products, the ability to add a kiwi friendly certification could be a very important marketing advantage. This may have wider application than just forestry.	2013	Medium	Northland Kiwi Forum / BNZSKT

5.3 Research, Monitoring and Innovation

The recovery of kiwi has greatly benefited from research and technology developments, and will continue to be dependent on good scientific understanding and development of adequate tools. Current limitations include affordability and the scale of pest management required, and the monitoring and management of episodic impacts (e.g. dogs and ferrets). New technology that addresses these limitations will provide the next big leap forward in kiwi recovery.

Most recent research for Northland brown kiwi has been undertaken by DOC and various research institutes within the Whangarei Kiwi Sanctuary and Trounson Kauri park. This largely involves management by research and is particularly concerned with development of cost effective and efficient predator control techniques. Methods to control the impact of dogs upon Northland brown kiwi is a critical research requirement at present.

5.3.1 Topic 19: Genetics and taxonomy

Background

Some recently established and isolated populations of kiwi will have passed through genetic bottlenecks (a significant reduction in the genetic diversity of a population). In the absence of a good understanding of the effects of reduced genetic diversity, kiwi management needs to apply a precautionary approach by minimising the risk of genetic bottlenecks occurring.

A basic requirement of any species recovery is a good understanding of the identity of the species (or other taxonomic units). While important progress has been made over the last decade in understanding kiwi taxonomy (Burbridge *et al.* 2003; Tennyson *et al.* 2003: Shepherd & Lambert 2008), some of the taxonomic work that has been completed still awaits formal publication, while other work awaits completion. Northland brown kiwi have been identified as one of four genetically distinct North Island brown taxa but further analysis of their genetic structuring is required to ascertain to what level are they distinct (Burbridge *et al*. 2003).

Issues

- The effects of genetic bottlenecks on kiwi populations have not yet been quantified and may be significant.
- Unresolved kiwi taxonomy leads to uncertainties about the importance of distinct populations.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 25.1: To formally clarify the taxonomy of kiwi
RP Objective 25.2: To maximize the genetic diversity of kiwi within each taxon within the bounds of natural rates of genetic exchange and to ensure that new populations are established with the

best possible composition of founders.

Taxon Plan Objective(s)
Objective 19.1: To formally clarify the taxonomy of Northland North Island brown kiwi.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Complete research on kiwi taxonomy by 2010 and formally publish findings	25.1	Research and Development Group	Essential
Support/lead research on the genetic diversity of translocated, captive, BNZ Operation Nest Egg-based and island populations by 2013	25.2	Research and Development Group	High
Research the implications of bottlenecking, fine scale diversity and genetic homogenisation	25.3	Research and Development Group	High

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
19.1	Support research into genetics and taxonomy through the provision of local field assistance and sample collection.	As and when required	Medium	DOC

5.3.2 Topic 20: Pest management

Background

Relatively effective pest control technologies and methodologies to protect kiwi exist, but they incur high labour costs and thus are unsustainable.

Without the development and application of new and more efficient technologies for pest control, kiwi will be limited to a few populations existing in relatively small, intensively managed pockets while unmanaged populations in the wild decline to extinction.

In Northland, dogs have surpassed mustelids as the main agents of decline, yet few tools are available to mitigate or reduce this problem. Kiwi avoidance training for dogs is used as one method to limit the impact of dogs on kiwi. Using a variety of methods invariably increases effectiveness of any predator control. In Northland the next frontier for kiwi recovery needs to be addressing and managing the threat that dogs pose for kiwi populations.

Kiwi are particularly vulnerable to predation between 30 and 90 days after hatching (McLennan *et al*. 2004), largely by stoats. Since stoats have been identified as the main predator of kiwi chicks a lot of effort has been focused on identifying and developing tools to minimise their impact. The most effective of these tools are now becoming widely used throughout kiwi habitat in Northland, and increasing effort is being put into their refinement. Recent results from the Whangarei Kiwi Sanctuary indicate that stoats may become trap shy in continuously trapped areas. It is important to continue research to develop secondary methods to control trap shy individuals and determine the optimal level of effort to maintain minimal stoat numbers.

Issues

- Existing technologies for pest control to protect kiwi are labour intensive and not always fully effective.
- Tools for dog control are limited or unproven.
- Stoats may become trap shy in continuously trapped areas.
- Pest management is expensive.
- Landscape scale cost-effective pest control methods are required.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 27.1: To improve the cost-effectiveness of pest control management
RP Objective 27.2: To reduce the impact of dogs on kiwi populations

Taxon Plan Objective(s)
Objective 20.1: To investigate effective innovative methods to reduce the impact of dogs on Northland brown kiwi
Objective 20.2: To support the investigation of large scale habitat management predator control options
Objective 20.3: To support the investigation of pig control options
Objective 20.4: To support the refinement of the kiwi aversion training program

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Support and / or lead the development of traps, bait toxins and delivery systems for control of mustelids, rats, cats and dogs in kiwi areas throughout the term of the plan	27.1	Research and Development Group	Essential
In collaboration with other landscape –scale predator control programmes, support/initiate the	27.2	Research and Development	Essential

development of integrated pest management techniques that support broader biodiversity maintenance and enhancement while fulfilling the goal for kiwi recovery		Group	
Support lead research into the effectiveness of kiwi avoidance training for dogs and standardise the technique according to research findings by 2010	27.4	Research and Development Group	Essential

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
20.1	Continue research within the Whangarei Sanctuary to determine optimal trapping and management regimes to minimize the stoat threat.	Throughout	Essential	DOC
20.2	Support and assist with research, development and trial of pest control methodologies for all key predators, including dogs, within the range of Northland brown kiwi.	Throughout	Essential	DOC
20.3	Develop and trial innovative dog control ideas and options within the Whangarei Kiwi Sanctuary and apply successful methods elsewhere in Northland	2010	Essential	DOC /Northland Kiwi Forum
20.4	Develop and trial pig control and trapping ideas	Throughout	medium	DOC
20.5	Ensure Northland aversion training trainers participate in the development and refinement of the aversion training and dog advocacy programme	Throughout	Essential	DOC /Northland Kiwi Forum

5.3.3 Topic 21: Kiwi monitoring

Background

Recovery effort needs to be directed by monitoring which provides information on population status and trends in managed and unmanaged populations. Several techniques are used in order to monitor kiwi presence, activity and population trends in an area. These are:

- Kiwi survey
- Call-count monitoring
- Territory mapping
- Footprint size
- Dog Surveys
- Telemetry
- Population modelling

These monitoring techniques are described in detail in the *Kiwi (Apteryx spp. Best Practice Manual* by Robertson and Colbourne 2003, summarised in Appendix 5

Issues

- Population trend monitoring requires long-term commitment of effort that is difficult to maintain with short-term funding cycles.
- Tools for broad population trend monitoring are unsuitable for low-density (e.g. widely dispersed) populations.
- Detailed population monitoring is complex and cost and labour intensive.
- There are few certified local kiwi dogs to carry out dog surveys.
- Call-count monitoring alone does not provide robust information on population size.

Objectives and Actions

Recovery Plan Objective(s)
RP Objective 28.1: To ensure that sufficient and robust information is available to assess the status and trends of kiwi species and key populations.

Taxon Plan Objective(s)
Objective 21.1: To ensure that sufficient and robust information is available to assess the status and population trends of Northland brown kiwi.

Recovery Plan Actions specified to meet objective(s)			
Action	**Action # (KRP)**	**Accountability**	**Priority**
Continue the nation-wide Kiwi Call Count Scheme and 5 or 10 yearly monitoring of banded populations in moderate to high density populations	28.1	Research and Development Group	High
Support/lead research on remote landscape scale monitoring methods for use sparse populations by 2013	28.2	Research and Development Group	High
Support / lead research into identification of individuals, e.g. automated call recognition, genetic fingerprinting from faeces or feathers by 2013	28.3	Research and Development Group	Medium
Support / lead research into the link between index methods (e.g. call counts) and the actual abundance of kiwi by 2013	28.4	Research and Development Group	High

Taxon Plan Actions required to achieve objective(s)				
#	**Action**	**Timeframe**	**Priority**	**Accountability**
21.1	Continue with the annual call-count monitoring throughout Northland to monitor population trends.	Throughout	Essential	DOC

21.2	Ensure the call-count monitoring program continues to be regionally coordinated.	Throughout	High	DOC
21.3	Have at least three local certified kiwi dogs available for project support and survey work.	2011 and throughout	High	DOC
21.4	Facilitate a workshop to train community kiwi practitioners in advanced kiwi monitoring methods.	Biannually from 2010	High	DOC / Northland Kiwi Forum
21.5	Provide support to community projects so they can more accurately estimate population numbers through analysis of monitoring data.	Throughout	High	DOC/Northland Kiwi Forum

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www.limestoneisland.org.nz - Friends of Matakohe - Limestone Island

www.savethekiwi.org.nz - BNZ Save the Kiwi Trust 2009

www.tossi.org.nz - Tawharanui Open Sanctuary Supporters Inc.

8. Appendices

Appendix 1

Timeline and priorities for recovery actions for Northland brown kiwi *(Apteryx mantelli).*

Shaded areas are years when actions should be implemented.

Priorities:
E = Essential - to be done within specified timeframe and/or frequency to achieve the goals for kiwi recovery over the term of this plan. Highest risk for kiwi recovery if not done within the specified timeframe and/or frequency
H = High - necessary to achieve long-term goals. To be progressed and ideally completed within the term of the plan, with moderate risk if not done within the specified timeframe and/or frequency
M = Medium - necessary to achieve long-term goals. To be progressed within the term of the plan but least risk if not completed within the term of the plan or within the specified timeframe and/or frequency

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
1.1	Northland North Island brown taxon plan completed to Conservator sign off.	E										
1.2	Northland Kiwi Forum formed to facilitate the implementation, review and maintenance of the Northland North Island brown taxon plan.	E										
1.3	The Northland Kiwi Forum will ensure information regarding kiwi management is obtained from the Kiwi Recovery Group and then distributed throughout the range of Northland brown kiwi and its stakeholders.	H										
1.4	Annual taxon plan review meetings held with Northland Kiwi Forum at the end of each breeding season. At least one additional meeting to be held during the year.	E										
1.5	Resourcing to be secured to service these meetings.	E										

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
1.6	Undertake full review of recovery progress and application of taxon plan at half way point of current plan (2009-2019)	E										
1.7	Establish a Northland Kiwi Administrator role.	E										
2.1	Ensure Best Practice is referred to and monitored throughout the term of the plan.	E										
2.2	Communicate developments in best practice, management and science to stakeholders.	E										
2.3	Provide regular (annual) pest control workshops to those involved in active field work – trapping techniques, sign recognition, monitoring, certification etc.	H										
2.4	Provide a regular (annual) Northland brown kiwi taxon hui for the sharing of information and best practice workshops.	H										
2.5	Produce a regular (annual) newsletter to be circulated amongst all Northland kiwi practitioners and stakeholders.	H										
2.6	Include update of Best Practice information where relevant to taxon plan half way review.	E										
2.7	Develop a Northland taxon website that is accessible to all groups and individuals working on the taxon.	M										
2.8	Establish a web site administrator	M										
2.9	Distribute national monitoring and data templates, and where required develop regional ones.	H										
3.1	Identify sites and establish two new populations in areas of their former range from where they are currently extinct	M										

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
3.2	Assess all population clusters currently under active management and identify opportunities to establish corridors between sites	H										
3.3	Identify key population clusters and strategies for establishment of corridors across the region as a long-term vision.	M										
3.4	Support predator control methods which provide ecosystem and kiwi recovery. This includes resourcing, investigating landscape scale pest control and application of best practice.	E										
3.5	Work closer with Councils to establish habitat protection and dog control and enforcement strategies.	E										
3.6	Increase dog aversion training and include all hunters, farmers, and rural residential occupants with dogs adjacent to key kiwi areas	E										
3.7	Complete the certification of all kiwi aversion trainers to enable training throughout the district.	E										
3.8	Encourage exotic forestry companies to apply kiwi friendly management techniques as per BNZ Save the Kiwi Forest management guidelines.	H										
3.9	Support the trailing of a dog toxin for feral dogs	M										
3.10	Swap or introduce new kiwi into closed or small populations to increase gene pool.	M										
4.1	Assess the potential for establishment of ecological corridors between Whangarei Kiwi Sanctuary areas and develop a strategy for establishing these.	M										
4.2	Assess the necessity of O.N.E against other more cost-effective means of supplementing Whangarei Kiwi Sanctuary populations.	H										

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
4.3	Continue with stoat research and other predator control methods.	E										
4.4	Maintain relationships and support of Landcare groups and surrounding landowners associated with the sanctuary.	E										
4.5	Establish lines of communication with other sanctuary staff throughout the country with regular debriefs / networking events.	H										
4.6	Explore the feasibility of researching the carrying capacity of the Whangarei Kiwi Sanctuary.	M										
5.1	Develop an island strategy for Northland brown kiwi that is consistent with the proposed national island strategy for kiwi, the DOC national island strategy and the taxon plan.	M										
5.2	Ascertain more accurate population estimates for all islands containing Northland brown kiwi.	M										
5.3	Swap or introduce new kiwi into closed or small populations to increase gene pool.	M										
5.4	Provide technical support and networking with landowner/ occupiers with island kiwi populations.	H										
5.5	Encourage minimizing the risk of predation by stoats on all offshore island kiwi populations.	M										
5.6	Include the residents of islands where dogs may be present in dog control advocacy and offer opportunities to undertake kiwi aversion training.	H										
6.1	Develop, maintain and implement island biosecurity plans and protocols for islands with Northland brown kiwi.	E										
6.2	Develop contingency plans for population of Northland brown kiwi on islands.	E										

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
7.1	Identify four sites where a minimum of 400 breeding pair of Northland brown kiwi can be secured per site within the next 10 years of the plan.	E										
7.2	Have a minimum of 1600 breeding pairs of kiwi secure in a minimum of four managed sites.	E										
7.3	Identify and secure at least six sites where between 50 and 200 breeding pair are currently present and where populations can be doubled within the next 10 years of plan.	E										
7.4	Populations are doubled within each of the six sites identified in Action 7.3.	E										
7.5	Idenitfy and secure a minimum of 15 additional sites under effective management and work towards expanding those areas with linkages.	E										
7.6	Work closely with existing and future community based projects to achieve the above.	E										
8.1	Apply landscape-scale integrated pest control at sufficient intervals at the sites with greatest potential gain, i.e. largest number of Northland brown kiwi that may or may not be receiving some sort of management effort. As per section 7.0 – 21 additional sites described in 7.3 and 7.5	E										
8.2	Establish two Northland additional kohanga kiwi sites within the existing and or former range of the Northland brown kiwi.	H										
8.3	Develop a consistent approach for managing or translocating scattered and isolated kiwi.	M										
9.1	Identify a minimum of two reintroduction sites within the former extent of the Northland brown kiwi range from which they are presently extinct.	M										

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
	Potential reintroduction sites include the Brynderywn-Mangawhai area, Shakespeare Park, Waitakere Ranges, and Te Paki (Pierce *et al*. 2006) Also intensively managed areas where kiwi have recently disappeared. Note: Same as action 3.1, section 5.3.1											
9.2	When kiwi are secure in viable populations at several locations within their current range, reintroduce kiwi to former parts of their historical range.	M										
9.3	Develop a long-term strategy for the establishment of local and regional corridors to enable gene flow across large parts of the Northland population (Pierce *et al*. 2006).Note: Same as actions 3.2 and 3.3, section 5.1.3)	H										
9.4	To support and or undertake further detailed surveys to conclusively identify the true extent of the Northland taxon distribution.	M										
9.5	To support research into the taxonomy of the Northland taxon of *Apteryx mantelli*.	H										
9.6	Develop an island strategy for the management of island populations to prevent bottlenecking / saturation. Note: Same as action 5.1, section 5.1.5	M										
9.7	Swap or introduce new kiwi into closed or small populations to increase gene pool.	M										
10.1	Establish a management plan for the Ponui Island mixed-provenance birds, addressing both short-term and long-term implications for this population. This should be considered as part of a national mixed-provenance plan.	H										

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
10.2	Identify areas on the mainland where mixed-provenance zones may have naturally occurred.	H										
10.3	Address the management plan for the Ponui Island birds, as determined by the Kiwi Recovery Group, in the taxon plan review.	E										
11.1	Representatives from Northlands captive facilities are actively involved in the recovery of the taxon and are included in the Northland Kiwi Forum.	E										
11.2	Captive institutions continue to apply the methods of best practice.	E										
12.1	Apply guidelines for when and where to use BNZ Operation Nest Egg™ to the management strategies for Northland brown kiwi.	H										
12.2	Provide recommendations to the development of a 10-year plan for BNZ Operation Nest Egg™, including number and location of incubation facilities and crèche sites, by 2010	H										
12.3	Support the safe use of BNZ Save the Kiwi Operation Nest Egg™ advocacy opportunities as part of a project's management tools	M										
13.1	Develop a strategic plan for the number and location of kiwi crèche and kohanga kiwi for Northland brown kiwi. Ensure that this correlates with the 10-year BNZ Operation Nest Egg Plan due in 2010.	H										
13.2	If required, establish and maintain two further kohanga kiwi in Northland to provide opportunities to strengthen or re-establish Northland kiwi populations. Note: Same as action 8.2, section 5.1.8	H										
13.3	Maintain at least one crèche site for the taxa	E										

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
14.1	Continue to encourage people to become actively involved in kiwi protection and facilitate kiwi projects to establish their own advocacy programs.	E										
14.2	Each Northland brown kiwi project advocate will become part of the national advocacy structure.	H										
14.3	Produce a regular newsletter to be distributed to all kiwi projects and interested stakeholders.	H										
14.4	Provide a regular kiwi hui for the sharing of information and best-practice workshops. Note: Same as action 2.4, section 5.1.2	H										
14.5	Identify at least 2-3 sites in Northland where kiwi practitioners / and selected tourism operators can provide kiwi experiences.	M										
14.6	Establish a Northland brown kiwi taxon website for the sharing of information and advocacy ideas. Note: Same as action 2.7, section 5.1.2	M										
14.7	Network with BNZ Save the Kiwi National Mentor for Advocacy for ideas and advocacy resources. These are to be circulated amongst kiwi projects and promoted on website.	H										
14.8	Establish and implement a dog control advocacy program throughout the range of Northland brown kiwi.	E										
14.9	Test dog advocacy, control solutions and ideas within the Whangarei kiwi sanctuary, which can then be applied elsewhere.	E										
14.10	Ensure that aversion training workshops optimise the advocacy opportunity. Have handout material available.	E										
14.11	Develop and deliver kiwi pack for statutory authorities and update as required. (Delivery by	E										

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
	project advocates - development by National Mentor for Advocacy).											
14.12	To support or undertake research into the eco-tourism potential and opportunities with Northland brown kiwi.	M										
15.1	To support existing and new initiatives in iwi led kiwi protection projects where this aligns with the overall Northland strategy detailed within the taxon plan.	E										
15.2	Establish a Northland iwi mentor – this may also be combined with the Northland Kiwi Administrator role. The Iwi mentor will assist interested tangata whenua in establishing their own advocacy programs.	E										
15.3	Identifying iwi kiwi champions to advocate and encourage kiwi recovery. At least one per DOC area	H										
15.4	Increase tangata whenua involvement in kiwi monitoring	H										
15.5	Northland brown kiwi hui to be biennial and moved around Northland region with specific iwi invitations.	H										
15.6	Aversion training on marae – one per rohe. Aim for a minimum of 12 sessions each year.	E										
16.1	Establish the Northland Kiwi Forum to provide support and disseminate best practice information as required. Note: Same as actions 1.2 & 1.3, section 5.1.1 and action 2.2, section 5.1.2	E										
16.2	Northland Kiwi forum representatives meet twice a year at six monthly intervals to disseminate information through their networks. Note: Same as action 1.4, section 5.1.1.	E										

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
16.3	Establish a Northland Kiwi Administrator role. Note: Same as action 1.7, section 5.1.1	E										
16.4	Provide a regular Northland brown kiwi taxon hui for the sharing of information and best practice workshops.	H										
16.5	Encourage continued capacity with NZ Landcare Trust and Department of Conservation to support local kiwi projects	E										
16.6	Develop a Northland taxon website that is accessible to all groups and individuals working on the taxon. Note: Same as action 2.7, section 5.1.2	M										
17.1	Local government inclusion in the Northland Kiwi Forum is encouraged.	H										
17.2	Provide a copy of this taxon plan to all councils and work with staff to apply it as appropriate.	H										
17.3	Develop a kiwi information pack for council staff that is relevant to the district and regional context.	H										
17.4	Include kiwi distribution maps in kiwi information packs and update regularly.	E										
17.5	Promote project relationships with councils.	H										
17.6	Encourage council monitoring of consent conditions. Explore with Councils the possibility for the Northland Kiwi Forum or a designated representative to assist the council in monitoring certain conditions of consent where there is a direct impact upon kiwi populations.	E										
17.7	Support consent conditions that establish no cat and dog clauses on subdivisions in high-density kiwi areas.	H										

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
17.8	Encourage subdivision requirements to design and implement habitat enhancement and predator control plans in or adjacent to areas of kiwi habitat.	H										
17.9	Identify opportunities to establish local and regional kiwi dispersal corridors and work with Councils to establish criteria and incentives within their framework to help see these realized.	M										
17.10	Work with Council's to develop innovative incentives to encourage landowners to retain, restore and protect areas of existing and potential kiwi habitat.	H										
18.1	Work alongside the industry, using the BNZ Save the Kiwi Forestry booklet, to encourage and train managers, owners and contractors to adopt silvicultural practices that allow kiwi to survive in exotic forests.	E										
18.2	Include key forestry representatives in the Northland Kiwi Forum.	H										
18.3	Refer foresters to the Department of Conservation Bay of Islands Area office forestry research.	M										
18.4	Ensure there are kiwi practitioners available to service the needs of the industry. This includes identifying the presence of kiwi and handling and translocating where required.	E										
18.5	Encourage forestry owners and staff to include their dogs in the kiwi aversion training.	E										
18.6	Establish a 'kiwi friendly' logo and accreditation system much like a certified organics or dolphin friendly tuna branding, for forestry activities. In light of increasing demand for sustainable forestry products, the ability to add a kiwi friendly certification could be a very important marketing	M										

Action #	Action	Priority	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19
	advantage. This may have wider application than just forestry.											
19.1	Support research into genetics and taxonomy through the provision of local field assistance and sample collection.	M										
20.1	Continue research within the Whangarei Sanctuary to determine optimal trapping and management regimes to minimize the stoat threat.	E										
20.2	Support and assist with research and development of pest control methodologies for all key predators, including dogs, within the range of Northland brown kiwi.	E										
21.1	Continue with the annual call-count monitoring throughout Northland to monitor population trends.	E										
21.2	Ensure the call-count monitoring program continues to be regionally coordinated.	H										
21.3	Have at least three local certified kiwi dogs available for project support and survey work.	H										
21.4	Facilitate a workshop to train community kiwi practitioners in advanced kiwi monitoring methods.	H										
21.5	Provide support to community projects so they can more accurately estimate population numbers.	H										

Appendix 2

Record of the process followed to develop this plan

This table will not become part of the published taxon plan but supports the process until completion.

Date	Action	Initiated by;	People involved	Outcome
Sept & Oct 07	Advertising public meetings	Emma Craig/Clea Gardiner/Wendy Sporle		
15 Oct 07	Public meeting-Whangarei	Emma Craig/ Wendy Sporle	General public, groups and iwi	Discus plan objectives and content ideas
16 Oct	Public meeting-Waipoua	Emma Craig/ Wendy Sporle/ Natasha Coad	General public, groups and iwi	Discus plan objectives and content ideas
17 Oct	Public meeting-Kaikohe	Emma Craig/ Wendy Sporle	General public, groups and iwi	Discus plan objectives and content ideas
18 Oct	Public meeting-Kaitaia	Emma Craig/ Wendy Sporle	General public, groups and iwi	Discus plan objectives and content ideas
19 Oct	Public meeting-Kaikohe	Emma Craig/ Wendy Sporle	Key people from previous meetings	Summarise discussions
2008	Collation and research begun	Emma Craig		
Dec 08	Template and guidelines provided	KR Group		Writers to wait until Kiwi Recovery Plan complete
Jan 09	Kiwi Recovery Plan complete	KR Group		
	delayed start to 20 march	Emma Craig		
22 March	Met with Emma	Wendy Sporle	Clea Gardiner Emma Craig	Confirmed end of March that she could not do it. Discussed options.
25 March	Approached Nic Renwick	Wendy Sporle		To see if she was available to write it under contract

	Checked with Avi & Clea re Nic doing it	Wendy Sporle		Approved as the writer but Emma to edit first draft
7 April	Began research, checking meeting notes and writing	Nic Renwick		
1 June	Received 1st draft	Wendy Sporle		Reviewed and added material
3 June	Draft sent to Emma and Clea	Clea & Emma		Reviewed and added material
23 June	Request specific input from Clea & Department of Conservation BOI.	Nic		
23 June	Emma returned first 1/3 –	to Nic		
29 June	Emma sent last sections –	To Nic		Edit
July 6	Compiled project detail table	Wendy Sporle		From information submitted by projects
1 July	Ponui discussion and aspects	Nic/Wendy	with Alison Perfect (Taranaki Plan) and KR Group	Ensure consistency between two plans
10 July	Maps developed by DOC			
11 July	Discussions re Department of Conservation projects	Wendy Sporle	Natasha Coad	Fill gaps re Department of Conservation management
14 July	Edit/Check	Wendy Sporle		Document checked
14 July	Submit to Kiwi Recovery Group for review	Wendy Sporle		Edited
4 August	Begin consultation distribution	Wendy Sporle		

Appendix 3.

Kiwi projects in Northland (NB This still has some info to be added)

Following is a table listing projects working to recover local kiwi. Information has been contributed by people from each of the projects. The trapping information has been provided to give a picture of the work carried out.

Population cluster	Parties involved	Start year	Area managed (ha) 2009	Kiwi pairs (2009 conservative estimate)	Listen-ing stations 2009	Form of management (eg trapping, ONE, crèche, Kohanga kiwi etc)	Additional management proposed over next 5 years	2008-2009 stoats trapped	2008-2009 cats trapped	2008-2009 chicks, juvenile released
Eastern										
Whangarei Heads	Whangarei Heads Landcare Forum,	1999	6000 With sanctuary	100+	19	Trapping, ONC, pig removal. No aversion training,, monitoring of adult kiwi	As before, plus increased community engagement advocacy, strategic use of dog toxin when available	19 on peninsula	18	13 sub-adults
Whangarei kiwi sanctuary - Whangarei Heads	DOC	1999	With above	With above	With above	With above	Increase dog advocacy, decrease kiwi monitoring	13	4	0
- Study blocks incl. Purua	DOC	1994	1000	Unknown, high call counts	7	Predator trapping, ONE, advocacy	Increase dog advocacy, decrease kiwi monitoring	18	38	0
- Riponui	DOC/private	1994	800	Unknown, high	1	Predator trapping, advocacy	Increase dog advocacy,	11	8	0

Population cluster	Parties involved	Start year	Area managed (ha) 2009	Kiwi pairs (2009 conservative estimate)	Listen-ing stations 2009	Form of management (eg trapping, ONE, crèche, Kohanga kiwi etc)	Additional management proposed over next 5 years	2008-2009 stoats trapped	2008-2009 cats trapped	2008-2009 chicks, juvenile released
							decrease kiwi monitoring			
Pipiwai	Hancocks forests/ DOC	2003	400	Unknown, low	2		Project stopped 2009	3	1	0
Ngunguru, Tutukaka	DOC / Tutukaka Landcare Coalition	2000	2025?	30+	6	Predator trapping, advocacy	Possible ONE	4	5	0
Mimiwhangata	DOC	1990	3000	Unknown, high	1	Predator trapping	n/a	6	2	0
Taupiri & Elliots Bay	NZ Kiwi Foundation	2004	120	4+ but unconfirmed	1					0
South Central										
Kiwi sanctuary - Motutau/ Marlow	DOC/ Ngati hine	1994	2000+	Unknown, moderate	5	Predator trapping, advocacy	Increase dog advocacy, decrease kiwi monitoring	13	5	0
Stoney Creek/ Worsp Rd	DOC, D & J Mackay	2007	4000	10	1	Predator trapping, advocacy	n/a			0
Kauri Coast										
Trounson Kauri Park	DOC	1995	445ha forest; 1000ha	c66pairs: Kiwi dog survey 2007: 1.09 kiwi /hr;	2 stations – only 1 undertaken 2009	DOC Mainland Island: mustelid, cat trapping; rodent &	Currently trialling DOC250's cf double set Fenn traps; Plan to compare single vs	Average over ten years: Ferret 3	Average Cat: 76	

Population cluster	Parties involved	Start year	Area managed (ha) 2009	Kiwi pairs (2009 conservative estimate)	Listen-ing stations 2009	Form of management (eg trapping, ONE, crèche, Kohanga kiwi etc)	Additional management proposed over next 5 years	2008-2009 stoats trapped	2008-2009 cats trapped	2008-2009 chicks, juvenile released
			surrounds	0.702 kiwi / km; c1 pair / 7.1ha		possum poison control	double entrance tunnels for DOC250s.	Stoat 46 Weasel 10		
Waipoua	Waipoua Forest Trust, Te Roroa	2004	1100 Trust & crown	50 pr	7	Predator trapping	Kohanga kiwi Including ONE .	Est. 40. 3 ferrets	3	0
Waipoua Forest	DOC		c12,000ha	c266 pairs of kiwi: Kiwi dog survey 2009: Yakas: 0.16 kiwi/hr; 0.219 kiwi/km. c1 pr / 45.2ha Lookout / Kakanui dog survey 2008: 0.209 kiwi/hr; 0.342 kiwi/km.	Repeated 14 1991 counts in 2008,2009-07-23; 2 long term stations:Lookout, Cathedral Grove.	Periodic aerial 1080 operations (~every 5 yrs); Some mustelid trapping 2002-2005.	Seek funding to undertake mustelid control in core areas.	-	-	-

Population cluster	Parties involved	Start year	Area managed (ha) 2009	Kiwi pairs (2009 conservative estimate)	Listen-ing stations 2009	Form of management (eg trapping, ONE, crèche, Kohanga kiwi etc)	Additional management proposed over next 5 years	2008-2009 stoats trapped	2008-2009 cats trapped	2008-2009 chicks, juvenile released
Waipoua: CoachRd, Mataraua Forest	DOC	1995	600ha	Kiwi dog survey 2008: 0.236 kiwi/hr; 0.173 kiwi/km.	Repeated 2 1999 sites in 2008	Seasonal kokako protection: 1995 initially nest protection; Currently 100m x100m possum and rodent gridline protection Sept-Jan, 100 single set Fenns in 600ha area.	Bring to best practise mustelid control for kiwi protection; Neighbouring landowner running 20 double set Fenns.		-	-
Waipoua Forest	Iwi O Te Roroa	-	-				Will be looking at working with DOC & WFT in future management –kiwi protection work			
Wekaweka	Wekaweka Landcare	2004	200	Unknown, moderate	Surveyed	Possum control- 6 months over summer; mustelid traps monthly checks throughout year; Rat control poisoning once a year.		0	0	0
Opouteke	Hancock Forest Management	2005	300ha by 9000h pines	40+ Kiwi dog survey 2008 0.27 kiwi / hr; 0.14 kiwi/km c1 pr /36ha	Surveyed	Trapping	Continued trapping, kiwi listening and kiwi health survey.	12	1	0

Population cluster	Parties involved	Start year	Area managed (ha) 2009	Kiwi pairs (2009 conservative estimate)	Listen-ing stations 2009	Form of management (eg trapping, ONE, crèche, Kohanga kiwi etc)	Additional management proposed over next 5 years	2008-2009 stoats trapped	2008-2009 cats trapped	2008-2009 chicks, juvenile released
Waima	Te Mahurehure Roopu Whenua Taonga Trust, DOC	2005		Unknown, moderate	Surveyed	Trapping for kokako and kiwi				0
Bay of Islands										
Hupara	Hupara Landcare	2005		Unknown, high	0					0
Russell Peninsula	N Z Kiwi Foundation	2000	2000	100+	Up to 7					0
	Russell Kiwi Landcare									0
Bay of Islands	DOC, island landowners									0
Waitangi	DOC	2001	1000	Unknown, high	2					0
Waikino	Waikino Group	2005	800	Unconfirmed Low	Surveyed					0
Kerikeri Peninsula	NZ Kiwi Foundation	1990	2500	80+	6					0
Wharau Rd (Sth side of KK Inlet)	NZ Kiwi Foundation	2002	500	10+	2					0
Purerua Peninsula	NZ Kiwi Foundation	20001	3000	200+	5					0

Population cluster	Parties involved	Start year	Area managed (ha) 2009	Kiwi pairs (2009 conservative estimate)	Listen-ing stations 2009	Form of management (eg trapping, ONE, crèche, Kohanga kiwi etc)	Additional management proposed over next 5 years	2008-2009 stoats trapped	2008-2009 cats trapped	2008-2009 chicks, juvenile released
Waimate North	Waimate North	2004	9000	500 Unconfirmed	12	Trapping	We hope to extend trap lines	66	80	0
Te Tii/ tapuaetahi	NZ Kiwi Foundation	2004	300	Low						0
Aroha island	Aroha Island Charitable Trust	2008		2		Trapping Education and advocacy	Trapping continued. Become major education facility			0
Kauri Cliffs	Julian Robertson, NZ Kiwi Foundation	2001	2500	10 unconfirmed	2					0
Takou Bay	Takou Were to Mokai , NZ Kiwi Foundation	2004	2000	10 unconfirmed	2	Trapping, possum control				0
Puketi	Puketi Forest Trust	2004	5500	c.60	12	trapping	Replace Fenns with DoC200's at 100m spacing rather than 200m as at present	134	16	0
Taupo Bay	Taupo Bay community group	2005	600	Unconfirmed low	0	trapping				0
Mahinepua	Mahinepua Radar Hills Landcare	2002	1835	*c.*20	19	Trapping/predator control		23	10	0

Population cluster	Parties involved	Start year	Area managed (ha) 2009	Kiwi pairs (2009 conservative estimate)	Listen-ing stations 2009	Form of management (eg trapping, ONE, crèche, Kohanga kiwi etc)	Additional management proposed over next 5 years	2008-2009 stoats trapped	2008-2009 cats trapped	2008-2009 chicks, juvenile released
	Group									
Kaitaia										
Whakaangi	Whakaangi Landcare Trust	2004	2900	200+	10	Trapping, baiting, integrated pest and predator control (possums, pigs, cats, rats, mustelids, hedgehogs)	Kohanga kiwi, supporting other far north kiwi projects, advocacy, aversion training programme	38	6	0
Wells Road	Higginson, Khaine	1990	40	Low	1	Trapping, baiting, intensive		4	3	0
Herekino	Renwick/Sporle	1990	50	Low	1			5	6	0
East Kaitaia	Baigent	2009	55	High		Setting up intensive management	Maintain intensive management	0	0	0
Takahue	Schou	1995	124	Med	1	Possum control, cat and mustelid trapping				0
Humphries Road	Blunden	2007				Trapping, possum baiting		7 3 ferrets	2	0
Honeymoon Valley	Group	2005 2009	500	Unconfirmed low	0	trapping				0
Puhio block	Forest Restoration Trust			Unconfirmed low						0

Population cluster	Parties involved	Start year	Area managed (ha) 2009	Kiwi pairs (2009 conservative estimate)	Listen-ing stations 2009	Form of management (eg trapping, ONE, crèche, Kohanga kiwi etc)	Additional management proposed over next 5 years	2008-2009 stoats trapped	2008-2009 cats trapped	2008-2009 chicks, juvenile released
Kohumaru Landcare		2008	272	3	1	Trapping with DOC 200's, Timms & legholds. Kiwi call monitoring.	Link all properties together. Trapping & monitoring.	0	0	0
East Herekino	NZ Kiwi Foundation	2005	2000+	Unconfirmed	0	Predator trapping				0
Herekino West	Herekino Landcare Group	2004	1000	Low, unconfirmed	0					0
Far North covenants	Qu E II, NZ Kiwi Foundation Several landholdings	2006	Approx 2500	Low-med		Trapping and possum control		*c* 40	*c* 8	0
Southern										
Rodney (Tawharanui Regional Park)	TOSSI & ARC	2006	550	20 (44 individuals released)	6	Predator proof fence	Dog survey 2012. Kohanga kiwi.			0
Rodney (Shakespear Regional Park)	SOSSI & ARC	2012	550	nil	nil	Predator proof fence 2009/10 Establish kiwi c. 2012	Predator proof fence 2009/10 Establish kiwi c. 2012			0
Islands										

Population cluster	Parties involved	Start year	Area managed (ha) 2009	Kiwi pairs (2009 conservative estimate)	Listen-ing stations 2009	Form of management (eg trapping, ONE, crèche, Kohanga kiwi etc)	Additional management proposed over next 5 years	2008-2009 stoats trapped	2008-2009 cats trapped	2008-2009 chicks, juvenile released
Matakohe	Friends of Matakohe/ Limestone Island Society, DOC	2001	39 plus the buffer zone	2 adult pair plus up to 25 chicks/juvenile	0	ONE, crèche, trapping on island & buffer. Intensive poison for rodents		3 on the island 11 in the buffer zone	0	11 ONE chicks to island. 2 island born. 14 juveniles taken off
Motukawanui	DOC	1990	380	Unknown high	0					
Motuora	Motuora Restoration society									
Kawau										0
Ponui/Brown Island				High						0

Appendix 4.

Northland brown kiwi key stakeholders.

Department of Conservation.

DOC is the lead agency responsible for kiwi recovery however not all area offices have funding and resources for active management. The main DOC led Northland brown kiwi projects are the Whangarei Kiwi Sanctuary and Trounson Kauri Park where intensive ecosystem management and research is undertaken. DOC is responsible for the development of this plan, and overseeing its implementation. Increasingly DOC's role is to provide technical support for the numerous Northland brown kiwi protection projects being run by community groups, trusts and volunteers, some of which are situated on public conservation land. DOC offices within the range of Northland brown kiwi are the Northland Conservancy which comprises the Whangarei Area Office, Kauri Coast Area Office, Bay of Islands Area Office and Kaitaia Area Office; Auckland Conservancy which includes the Warkworth Area Office and Auckland Area Office.

Tangata whenua

Northland brown kiwi are found throughout the rohe of many iwi groups, most of which play an active and supportive role in kiwi management. Tangata whenua within the historical and current distribution of Northland brown kiwi include: Ngati Kuri, Ngai Takoto, Te Aupouri, Te Rarawa, Ngati Kahu, Ngati Kahu ki Whangaroa, Ngapuhi, Te Roroa, Te Uri o Hau, Te Iwi o Ngati Wai, Ngati Hine, Te Parawhau, Te Iwi o Te Roroa, Whiranaki Maori community, Pakanai Hapu Resource community, Hita Whanau Trust, Te Runanga o Nga Puhi, Ngati Manuhiri, Ngati Rehua, Ngati Poa, Ngai Tai ki Tamaki, Te Kawarau a Maki, Hauraki Maori Trustboard, Ngati Whatua, Ngati Paoa, Kawerau a Maki.

Some tangata whenua are establishing their own kiwi projects. These include:

- Takou Were Te Mokai Landcare – who are working to enhance brown kiwi populations in the Takou Bay area with support from NZ Kiwi Foundation. Takou Were Mokai Landcare are committed to making their area free of predators and see education and kiwi protection as paramount.
- Ngati Hine have projects which work alongside Whangarei Kiwi Sanctuary areas.
- During the development of this plan Te Uri o Hau representatives stated they wanted to begin active kiwi management in their rohe by identifying two areas where kiwi projects could be established, within the tenure of this plan.

Organisations businesses and agencies including BNZ Save the Kiwi Trust, NZ Landcare Trust, NZ Kiwi Foundation, Bank of New Zealand,

CHLOROTIS, Total Kiwi Services, RITO- *Conservation Advocacy Education and Design*, Queen Elizabeth II National Trust, Forest Restoration Trust.

Community groups: The larger projects include Whangarei Heads Landcare Forum, Whakaangi Landcare Trust, Mahinepua/Radar Hill, Waimate North, NZ Kiwi Foundation, Puketi Forest Trust, Friends of Matakohe/Limestone Island, Tutukaka Landcare Coalition, Bream Head Restoration Committee, Bream Head Trust, Waipoua Forest Trust, Wekaweka Landcare Trust, Te Mahurehure Roopu Whenua Taonga. Motuora Restoration Society, Kawai Island Kiwi project, Tawharanui Open Sanctuary Supporters Inc.

Captive and BNZ Operation Nest Egg™ facilities
The Auckland Zoo, the Whangarei Native Bird Recovery Centre and Whangarei Museum and Kiwi House.

Sponsors (BNZSKT). Kiwi project funds are often obtained by submitting funding applications to various funding agencies. BNZ Save the Kiwi Trust is the main corporate sponsor of kiwi projects in Northland.

Regional and Local authorities
Northland Regional Council, Auckland Regional Council, Far North District Council Whangarei District Council, Kaipara District Council, Rodney District Council.

Vets and Bird Rescue Facilities
Veterinary support is essential for kiwi projects. Northland has vets and animal health specialists available to administer first aid and initial intervention for injured and sick kiwi. In the Far North, Wendy Sporle and Lesley Baigent have facilities for kiwi treatment and rehabilitation. In the Mid North the Kamo vet clinic can provide treatment. The Whangarei Native Bird Recovery Center provides treatment and rehabilitation. Kiwi near Auckland are taken to local vets for stabilisation and transferred to Auckland Zoo. Kiwi with any major injuries and illness are transferred to Massey University Wildlife Health Center (06 350 5329, weekends- 06 350 5955 and weeknights 027 246 2267)

Individual land owners
Throughout the region individual landowners are carrying out pest and predator control on their properties in order to recover kiwi. Some properties are self managed and others contract trappers from NZ Kiwi Foundation. Many of these managed areas are legally protected through Queen Elizabeth II National Trust.

Many private landowners support local kiwi projects by allowing access through or management on their land. This is an important contribution to regional kiwi recovery.

Appendix 5

Topic 21- Summary of Kiwi Monitoring Methods

Call-count monitoring

Call count monitoring was originally established in the mid 1990s and is the predominant technique used to measure trends in Northland kiwi abundance (McLennan 1992; Robertson & Colbourne 2003). It involves listening and recording kiwi calls during the dark phase of the moon in late May-June. As male and female kiwi produce very different sounding calls it is possible to identify the presence of pairs in an area. Also as most territorial kiwi call regularly and very loudly, it is possible to identify the direction and relative distance of the call up to 1.5km away (Robertson & Colbourne 2003). Most sites in Northland are monitored annually and data is collated into an annual Northland monitoring report. Some more remote populations receive five yearly monitoring. There are some inaccuracies with this method, including underestimating kiwi density.

Territorial Mapping

In addition to collecting call-count records, it is useful to map the locations of birds calling as this helps to determine the number of pairs in each listening area (Pierce *et al.* 2006). Territory mapping can also be carried out by telemetry tracking of kiwi with transmitters on. Location can be recorded on maps.

Footprint size

Measuring the length of all kiwi footprints seen during the winter months can provide an indication as to whether young birds are being recruited into a population. Footprint lengths of *c.*50-80 mm represent young kiwi that have survived (or hatched after) the summer period of greatest stoat abundance. Footprints over 90 mm in length are likely to be adults (Pierce *et al.* 2006).

Dog surveys to determine age structure of the population

Valuable information on the age and sex structure of high-density kiwi populations can be derived from samples of birds located by specially trained kiwi dogs. This is achieved by using a certified kiwi dog and handler to find and age a sample of 20-30 kiwi. This method helps to determine the survival of kiwi chicks and juveniles and can be repeated at 3-5 year intervals (Pierce *et al*. 2006). The proportion of juveniles to adults reflects the health of the population. If a percentage of juvenile kiwi are found in the population it is an indication predator control is effectively protecting chicks (Robertson & Colbourne 2003).

Telemetry

Radio-telemetry is considered to be the best tool to monitor the survival and movement of kiwi and it is used as the primary tool to find nests and follow their fate. Adult kiwi are large enough to carry transmitters with a battery life

of approximately one year and these provide a signal strong enough to be picked up several kilometres away. Most kiwi radio-tracking is done from the ground because kiwi are relatively sedentary, however some kiwi, especially juveniles and sub-adults, can wander long distances (20+ km) and the only effective way to find them is to detect their signal and identify their general location from an aircraft.

Population modeling

A population can be modelled or estimated by analysing data collected from monitoring individual kiwi via radio transmitters. Information about breeding, recruitment and mortality is collated to provide a statistical representation of the population now and in the future. This assists with estimating population trends and is an additional tool that can be used to evaluate the effectiveness of a kiwi recovery programme.