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

Strategic plan for Northland brown kiwi, 2010–2019 and beyond

Emma Craig, Clea Gardiner, Nicky Renwick and Wendy Sporle

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CONTENTS

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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 supporting its implementation and review.

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

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. They are 'best advice' for all stakeholders regarding goals, objectives and actions, priorities and opportunities, for the management of individual taxa. 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, for example, the Kiwi Best Practice Manual (Robertson & Colbourne 2003).

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

The accountability for each taxon plan is attributed to a lead conservancy, and implementation is supported in consultation with and guidance by the Kiwi Recovery Group. In Northland, the implementation and review of the taxon plan will be supported by a 'taxon group' (Northland Kiwi Forum), which includes key stakeholders and participants in the recovery of Northland kiwi.

The Department of Conservation (DOC) has responsibilities under Te Tiriti o Waitangi, the Conservation Act and various Treaty settlement acts to recognise and provide for the involvement of tangata whenua in all aspects of kiwi recovery. It is recognised that within the lifetime of this plan some Treaty settlement claims within Northland will be finalised, and this will likely alter the ownership of some areas of kiwi habitat from public conservation land to iwi land.

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[1] **Species**—a formally described (i.e. published in the scientific literature), base unit of taxonomic rank usually applied to groups of organisms capable of interbreeding and producing fertile off spring. Five species of kiwi are described: Brown kiwi, rowi, tokoeka, great spotted and little spotted kiwi.

Taxa—Inclusive of any level of taxonomic rank. In this context it includes the five described species and four genetically distinct taxa of kiwi currently recognised but not formally described within the species brown (Northland, Coromandel, eastern and western) and tokoeka (Haast, Northern and Southern Fiordland and Stewart Island).

Taxon—a taxonomic category or group, such as a phylum, order, family, genus or species. A taxon usually includes several taxa.

Executive summary

This plan is for Northland brown kiwi, one of four distinct brown kiwi (*Apteryx mantelli*) taxa. This is the first taxon plan to guide the conservation of this taxon, and is a practical guide for all individuals and groups involved in the recovery of Northland brown kiwi. This plan provides a framework and context for recovery planning. It also examines the current conservation status of Northland brown kiwi, the management and monitoring programmes currently underway, and the options for minimising population decline and restoring Northland brown kiwi in its historical range.

The Northland brown kiwi is unique in terms of its genetic makeup, behaviour and ecology. At a total population of approximately 8000, the Northland brown kiwi comprises almost one third of the estimated 25,000 brown kiwi remaining in New Zealand. These 8000 kiwi inhabit 25 population clusters throughout Northland, including populations on offshore islands and at Tawharanui Open Sanctuary. Kiwi conservation programmes in Northland are on both public and private land, and there is huge community responsibility for, and involvement in, kiwi protection. The ability to sustain kiwi populations in Northland is increasing as more tangata whenua, individuals and community groups take on kiwi protection.

The aim of this taxon plan is *to restore and, wherever possible, enhance the abundance, distribution and genetic diversity…* of the Northland taxon, as per the long-term goal of the Kiwi Recovery Plan (2008–2018). This plan contains 21 goals with 89 action points. These goals and actions are grouped under three theme headings: management, community relations and engagement, and research, monitoring and innovation. Each action point is prioritised, timelined and allocates delivery responsibilities.

The focus for kiwi recovery in Northland has changed from the protection of individual kiwi to the protection of kiwi habitat. There are now approximately 52 000 ha of kiwi habitat under active management, supporting more that 1000 breeding pairs of kiwi. By 2019, it is intended that a minimum of 2800 breeding pairs within 12 managed sites will be protected from threats, a further 15 sites will be under active management, and work towards expanding these areas through linkages will be underway.

The recovery and protection of Northland brown kiwi relies on the interest, understanding, engagement and collaboration of many sectors of the community. Tangata whenua-, community- and landowner-led kiwi conservation projects have been successfully established within Northland. The long-term sustainability of these projects requires the ongoing energy and enthusiasm of the groups and individuals involved, and ongoing funding to sustain protection efforts.

The recovery of kiwi has greatly benefited from research and technological developments, and will continue to be dependent on sound scientific understanding and the development of adequate tools.

Dog predation is the largest issue for Northland brown kiwi. Resolving this issue through an intensive advocacy campaign, the creation of no dogs zones and subdivisions in some areas, kiwi aversion training for dogs, and through development of dog control techniques, is an important focus of this plan.

A key feature of this taxon plan is the establishment of the Northland Kiwi Forum. The role of the Forum is to facilitate the implementation of some of the actions of this 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 support, access to technical and best practice information, and an avenue for networking.

The term of this plan is 2010 to 2019 (staggered by 1 year from the recovery plan) and it will be subject to an annual progress review.

1. Introduction

Kiwi are a taonga to Māori and are much revered within New Zealand culture, yet despite their high profile and iconic status, kiwi are in serious decline. Though they were once widespread throughout New Zealand, their abundance and distribution have been severely reduced as a consequence of human settlement. The ongoing effects of habitat loss, land development, and species introductions have led to the continuing decline of kiwi. Despite positive gains in managed populations, kiwi remain at small population size and/or in decline overall, thus all kiwi taxa are classified as threatened.

Kiwi are endemic to New Zealand. They have unique characteristics including nostrils positioned at the end of their long bill, vestigial wings with no practical function, no external tail, and the production of one of the largest known eggs in relation to body size for birds. The kiwi has been 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.

There are currently five recognised species of kiwi: brown kiwi (*Apteryx mantelli*); rowi (*A. rowi*); tokoeka (*A. australis*); great spotted kiwi (*A. haastii*); and little spotted kiwi (*A. owenii*; Burbridge et al. 2003). Within brown kiwi there are four genetically distinct and geographically isolated taxa. These are located in Northland (Northland and Auckland regions), Coromandel, Eastern North Island (Hawke's Bay, East Cape and Bay of Plenty to Rotorua) and Western North Island (Waikato, King Country, Central Plateau, Taranaki and Whanganui).

At approximately 8000 individuals, the Northland brown kiwi population accounts for almost one third of the estimated 25 000 brown kiwi in New Zealand (Holzapfel et al. 2008). These 8000 kiwi inhabit 25 population clusters throughout Northland (Pierce et al. 2006), including populations on offshore islands and at Tawharanui Open Sanctuary. Kiwi conservation programmes in Northland are on both public and private land, and there is huge community responsibility for, and involvement in, kiwi protection. The ability to sustain kiwi populations in Northland is increasing as more tangata whenua, individuals and community groups take on kiwi protection.

The Northland Brown kiwi taxon plan is the first such plan to guide the conservation of this taxon. Kiwi in Northland face unique threats and challenges, and the geographically disjointed populations of kiwi in Northland warrant separate management from other brown kiwi (Herbert & Daugherty 2002). This taxon plan is a practical guide for the Department of Conservation (DOC) and all groups, individuals and agencies involved in the recovery of Northland brown kiwi. The plan provides a planning framework and context for recovery planning. It also examines the current conservation status of Northland brown kiwi, the management and monitoring techniques currently underway, and the options for halting any further decline and for restoring the species in its historical range.

2. Plan term and review date

The term of this plan is from 2010 to 2019 (staggered by 1 year from the recovery plan) and it 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 programmes may falter and isolated populations may become unable to reproduce and to respond to disease and environmental change.

Early kiwi taxonomy was based entirely on morphological (physical characteristic) differences. However, the advent of genetic science has enabled the identification of marked differences which are not physically obvious. As recently as 2003, Burbridge et al. (2003) used mtDNA analysis to identify four genetically distinct and geographically isolated taxa within the North Island brown species (*A. mantelli*): Northland, Coromandel, western and eastern.

Although there are few physical differences between the taxa, the genetic differences are significant enough to warrant each taxon being managed as a distinct conservation unit with no translocation of individuals between taxa (Herbert & Daugherty 2002). However, Burbridge et al. (2003) recommend further investigation into the genetic structuring of the brown kiwi taxa to confirm these conservation management units. Within the range of each taxon there are likely to be further localised genetic differences; within Northland brown kiwi there is a possible variation from west to east, and from north to south (Hugh Robertson, DOC Wellington, pers. comm.). Just how many species or subspecies of kiwi should be formally recognised has not yet been determined, but using a precautionary principle, Northland brown kiwi will be managed separately from other brown kiwi taxa.

3.2 Biology and ecology

The Northland brown kiwi is unique in terms of its genetic makeup, behaviour and ecology, and is slightly larger and heavier than the three other brown kiwi taxa.

The Northland brown kiwi grows to around 40 cm in height and, as with all species of kiwi, there is a marked difference in size between the sexes. The adult females are, on average, about 30% heavier than the males, weighing around 2.7 kg. The males average 2.1 kg (Heather & Robertson 2005; Pierce et al. 2006; Hugh Robertson pers. comm.).

Female Northland brown kiwi have a bill length ranging from 117 mm to 156 mm, and male Northland brown kiwi have a bill length ranging from 86 mm to 119 mm (Colbourne & Kleinpaste 1983; Hugh Robertson, unpubl. data). It is not possible to distinguish a juvenile female from an adult male based on physical attributes alone (Heather & Robertson 2005), and so sexing of males and juveniles is best done from analysis of DNA in a sample of their feathers (Huynen et al. 2003).

Northland brown kiwi are usually monogamous and generally pair-bond for life. The male undertakes the preparation of the nest and the incubation of the eggs. On occasion, the female may be found in the nest, either by herself or with the male (Colbourne 2002) and/or chick(s) (Pete Graham, DOC Northland, pers. comm.). The nest is typically an excavated burrow, but may also be under vegetation or beneath logs and tree roots (Pierce et al. 2006).

Because of the relatively warm climate in Northland, and 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 second clutches laid from October to December (Pierce et al. 2006). Eggs are laid about 3 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 generally produce two eggs per clutch, and can produce three clutches per season, although one or two is more usual (Burbridge et al. 2003).

Northland brown kiwi can successfully breed at 1 year of age (e.g. on Motuora Island, Rogan Colbourne, DOC Wellington, 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 they also have the highest adult mortality rates. Life expectancy of Northland brown kiwi is only 14 years compared with 40–65 years elsewhere in the country (Robertson et al. in press). This is largely a consequence of predation in unmanaged populations, particularly by dogs.

The preferred habitats of Northland kiwi are damp gullies in both indigenous and plantation forest, and dense shrubland. They also commonly utilise wetlands, gorse-dominant shrubland and rough pasture.

Northland brown kiwi are nocturnal, although young chicks are occasionally observed foraging during the day. They generally have multiple daytime shelters within their territory comprising burrows, fallen nīkau fronds, hollow logs, tight vegetation and slash from land-clearing or plantation forest harvest (McLennan et al. 1987).

Adult brown kiwi are territorial, and they will remain in an area for as long as suitable habitat is retained (Pierce et al. 2006). An adult bird will have a territory that tends to overlap with its mate's. It will allow chicks and juveniles into its territory, but generally will not tolerate the presence of other adult kiwi (Colbourne & Kleinpaste 1983). Juvenile kiwi usually remain within 1 km of their natal site for their first 6 months of life before dispersing up to 20 km away (Pierce et al. 2006). Sub-adult kiwi will usually settle into a territory prior to their first mating attempt (Miriam Ritchie, DOC Northland, pers. comm.). Territories are largely maintained through vocalisation (Colbourne & Kleinpaste 1983; McLennan & McCann 1991), but birds will become combative if they need to.

Territorial boundaries and the number of kiwi in an area largely depend upon resource availability. Territory sizes may be smaller where there are more invertebrates and the soil is easier to probe. Territory placement is important for kiwi, particularly during dry summer months. Those without access to lower, wetter slopes and swamp margins are likely to lose condition (Colbourne & Kleinpaste 1983).

Kiwi diet predominantly consists of invertebrates such as insect larvae, wēta, crickets, centipedes, moths, earthworms and spiders, but it may also include occasional fruit, berries and leaves (Robertson & Colbourne 2003).

3.3 Past and present distribution and population trends

Prior to human arrival, kiwi were found in high numbers throughout New Zealand, with the distribution of Northland brown kiwi likely extending throughout Northland from the Aupouri Peninsula in the north to the Auckland region in the south. By the 1970s, their range was limited to mostly forest and shrubland areas between Awanui and the Brynderwyn Ranges (Pierce et al. 2006) (Fig. 1). Unfortunately, the 1970s and 1980s saw a rapid decline throughout much of Northland, resulting in the localised extinction of kiwi from many areas, largely as a consequence of predation from introduced mammals (Pierce et al. 2006). In 1996, McLennan et al. (1996) calculated that North Island kiwi had probably declined in abundance by at least 90% in the previous 100 years.

The current distribution of Northland brown kiwi extends from Whakaangi in the north to the translocated population at Tawharanui Open Sanctuary in the south (Fig. 1). They are also present on offshore islands from the Bay of Islands in the north to the Hauraki Gulf in the south. Islands with kiwi include Motukawanui, Motuarohia Island (Roberton Island),

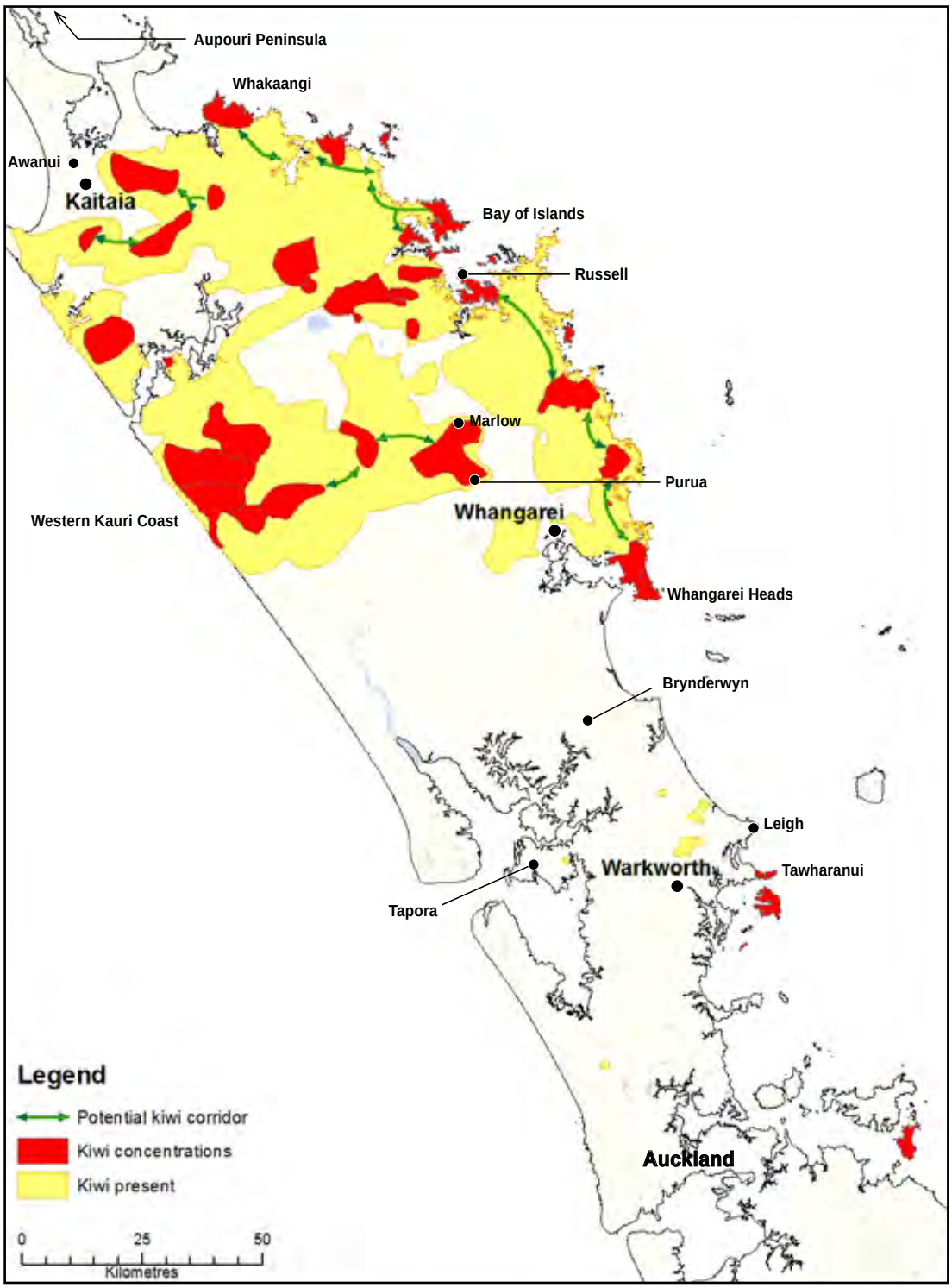

Figure 1. Approximate Northland brown kiwi distribution and relative abundance, 2009.

Moturua, Limestone (hereafter referred to as Matakohe-Limestone Island), Kawau and Motuora (Colbourne 2005). Kiwi are all but extinct from southern Northland and the Aupouri Peninsula in the far north. A mixed-provenance population exists on Ponui Island (Chamberlins Island) (hereafter Ponui Island), of Northland and Hauturu/Little Barrier Island founders. There are also unconfirmed reports of kiwi present in northern parts of the Auckland region around Leigh and Tapora (Thelma Wilson, DOC Northland, pers. comm.), the latter as a result of translocations in the 1980s.

The 25 population clusters of Northland brown kiwi are distributed within seven main geographical groupings (Pierce et al. 2006):

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

Northland is considered to be a stronghold for brown kiwi, as it contains around 32% of the total New Zealand population. If current management effort is maintained, this population is expected to climb from 8000 birds in 2008 to 8500 birds by 2018. This estimate is based on 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).

This small predicted increase assumes that current efforts are simply maintaining the population rather than leading to further recovery. As noted in the Kiwi Recovery Plan (Holzapfel et al. 2008), 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. There are historical records from the late 1800s that estimate densities of 0.4–1 adult kiwi per ha in North Island forests (Buller 1877, 1888 in McLennan et al. 1996). These densities are not unheard of today, with current densities of one pair per 2–5 ha in well-managed Northland forests. Pierce et al. 2006 estimated that if all components of a forest were well managed, 1000–2500 ha could potentially accommodate 500 pairs.

3.4 Threat status

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*; however, Miskelly et al. (2008) assessed the threat ranking of brown kiwi as being 'Nationally Vulnerable', a slight improvement on the previous 'Serious Decline' ranking (Hitchmough et al. 2005). This is because the decline rate is lower than previously thought, and has been reduced through conservation management efforts.

3.5 Agents of decline and current threats

In pre-human times, kiwi populations would have fluctuated in accordance with natural processes such as climate change, glaciations, volcanic activity and fire. However, the arrival of humans had a significant and adverse affect upon all kiwi populations. Early Māori cleared extensive tracts of land through burning, harvested kiwi as a resource, and introduced dogs and kiore. This resulted in population and range reductions of kiwi in Northland and elsewhere. The arrival of Europeans and the mammalian predators and competitors they brought with them caused the rate of habitat loss and predation to increase dramatically, resulting in the continued decline of kiwi up to the present day (Holzapfel et al. 2008).

Although human hunting for kiwi is no longer a major threat, habitat loss and predation by introduced mammalian predators—in particular dogs (*Canis familiaris*), stoats (*Mustela erminea*), cats (*Felis catus*), and ferrets (*Mustela putorius*)—remain ongoing threats to kiwi recovery. In Northland, predation remains the primary cause of decline in all unmanaged populations (Pierce et al. 2006).

Dogs are currently the single biggest threat facing Northland kiwi, surpassing even the impact of unmanaged stoat populations (Miller & Pierce 1995; Hugh Robertson, unpubl. data). Dogs can cause massive and rapid localised reductions in kiwi populations, and are able to kill kiwi at all life stages. Their being able to kill adults is of particular concern, as the loss of adults greatly reduces population recruitment. At present, it is domestic (pet, farm or hunting) dogs that are responsible for kiwi deaths. However, there are also unconfirmed reports of feral dogs living and breeding in Northland forests (Natasha Coad, With a Nose for Conservation, Akaroa, pers. comm.), which is of additional concern.

Stoats are present in all kiwi habitats in mainland Northland and are a threat to juvenile kiwi (Pierce et al. 2006). Feral and domestic cats kill kiwi chicks and sub-adults and are present throughout most Northland kiwi habitat. Ferrets are capable of killing adult kiwi, and although not abundant in Northland, wherever they are locally common their impacts on kiwi can be severe (Pierce et al. 2006).

Northland kiwi also face predation and competition pressure from other introduced species such as possums (*Trichosurus vulpecula*), rats (*Rattus rattus*), hedgehogs (*Erinaceus europaeus*) and pigs (*Sus scrofa*). They are vulnerable to vehicle strike, capture in possum traps set on the ground, entrapment in cattle stops, and drowning in ponds, cattle troughs and swimming pools (Pierce et al. 2006). Their frequent occurrence in settled areas means they are vulnerable to urban-based activities and domestic pets.

Current threats to Northland brown kiwi also include genetic bottlenecking in isolated populations (a bottleneck is a significant reduction in the genetic diversity of a population), 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 (Butler & McLennan 1991) and 1996–2008 (Robertson 2003)), 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 being the pilot area for intensive advocacy work. This was initially funded by DOC and BNZ Save the Kiwi Trust (BNZSKT, previously BNZ Kiwi Recovery), and involved extensive work within the community.

This effort resulted in elevated public interest in the conservation of Northland brown kiwi. Work is ongoing in this area, with kiwi advocacy now focussed predominantly on reducing the effects of dogs and other threats, assisting landowner and community groups with their kiwi protection projects, and encouraging these groups to establish their own advocacy programmes. Advocacy efforts have also resulted in the provision of kiwi protection in some council District Plans which have a requirement for developers to mitigate the effects of land development upon kiwi. Iwi have been pivotal in Northland in resource consent conditions regulating against predatory pets within new subdivisions in close proximity to known kiwi habitat.

Numerous individuals, community projects and agencies have undertaken kiwi advocacy work. These include DOC projects at the Whangarei Kiwi Sanctuary (WKS) and Trounson Kauri Park; BNZSKT; NZ Landcare Trust; NZ Kiwi Foundation; Queen Elizabeth II National Trust; Auckland Zoo; the Whangarei Native Bird Recovery Centre; and the Whangarei Museum.

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 for Haast tokoeka, rowi and three genetically distinct North Island brown populations (at Whangarei, Moehau and Tongariro). The aim of the kiwi sanctuaries is to enable the recovery of the most critically endangered kiwi taxa and to maintain the overall genetic diversity of kiwi. They also have a role in testing recovery methods that can then be applied by other projects. (Robertson 2004).

The Whangarei Kiwi Sanctuary (WKS, Fig. 2) comprises 17 400 ha of kiwi habitat, of which half is on public conservation land and half on private, forestry or council-owned land. It includes fragmented forested areas to the southeast and northwest of Whangarei, which range from 30 ha to 700 ha in size. Several landcare community groups support DOC by actively protecting kiwi in these sanctuary areas.

The purpose of the WKS is to enhance the mainland kiwi population by intensively controlling predators. Other key areas of focus for the WKS are 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 (Robertson 2004).

Figure 2. Whangarei Kiwi Sanctuary map.

3.6.3 Other DOC projects

Waipoua Forest

Waipoua Forest was once considered to hold one of the North Island's largest kiwi populations. Call count monitoring and kiwi dog surveys suggest the kiwi population in the Waipoua Forest has declined and the remaining birds are at low densities. This decline is attributed to predation at all life stages. Parts of the Waipoua Forest are trapped to control mustelids (weasels, stoats and ferrets).

Waitangi Endowment Forest

Bay of Islands Area Office staff and Waitangi Endowment Forest contractors have been working together to establish a kiwi-safe forest harvesting regime. Prior to forest harvesting, kiwi are located and radio transmitters attached. Radio signals are checked on each day of the harvest. Those within the imminent harvest area are relocated nearby, those deemed to be in safe areas are left in situ. This project has been shown to work successfully. Cats and mustelids are also trapped in these areas.

3.6.4 Community projects

At the time of writing, there were approximately 38 sites on private and public lands across the Northland and Auckland regions that were (or were in the process of) being actively managed for kiwi protection (Fig. 3 and Table 1; Appendix 1). These included collaborative projects involving landowners, DOC, community and landcare groups, NZ Kiwi Foundation, Queen Elizabeth II National Trust and Hancock Forests (Pierce et al. 2006).

The recovery of Northland brown kiwi is greatly enhanced by the efforts of landowners who have undertaken habitat restoration and pest control. Some projects are closely tied with DOC programmes, whilst others work more independently and, in some instances, a number of adjoining landowners have combined their protection efforts to maximise benefits to kiwi, with some of the larger projects forming charitable trusts.

3.6.5 National kiwi call-count monitoring and other kiwi monitoring

Annual call-count monitoring has been undertaken since 1995 and continues to be carried out to monitor Northland brown kiwi at 23 original listening stations throughout the Northland region (Pierce 2008).

As more community groups become involved, the number of managed sites at which call-count monitoring is undertaken in Northland is increasing, with data for 2009 being received from at least 113 stations throughout Northland.

Northland brown kiwi are also monitored using telemetry, recording of footprint sizes and surveys using kiwi dogs (dogs trained to detect kiwi).

3.6.6 BNZ Operation Nest Egg™ and kōhanga kiwi

BNZ Operation Nest Egg™ (BNZONE) involves collecting eggs from the wild, hatching the eggs in captivity, raising the chicks at crèche sites until they reach a weight of 1200 g or more (at this weight they are considered likely to be able to defend themselves against stoats), then returning the juvenile kiwi to the wild. The captive facilities involved in BNZONE for Northland brown kiwi are Auckland Zoo and the Whangarei Native Bird Recovery Centre. The crèche sites used are Matakohe-Limestone Island and Motuora Island. Chicks are also translocated directly from the source population to the crèche where they remain until reaching 1200 g in weight. Once removed from island crèche sites, kiwi may be returned to their original source population, or used to supplement other populations, or used to establish new populations within the historical range of the species. A BNZONE bird has a 65% chance of surviving to adulthood compared with just 5% for wild-hatched and raised chicks.

BNZONE is an effective means of recovering kiwi populations, particularly where the population is small and there are concerns about fertility or lack of genetic variation (Pierce et al. 2006). BNZONE chicks have been used to supplement kiwi populations within the WKS, including Bream Head and Whangarei Heads Landcare Forum areas. They have also been used to found the new population at Tawharanui Open Sanctuary. BNZONE has the added benefit of being an excellent advocacy tool, as it provides opportunities for people to have kiwi encounters and encourages media interest.

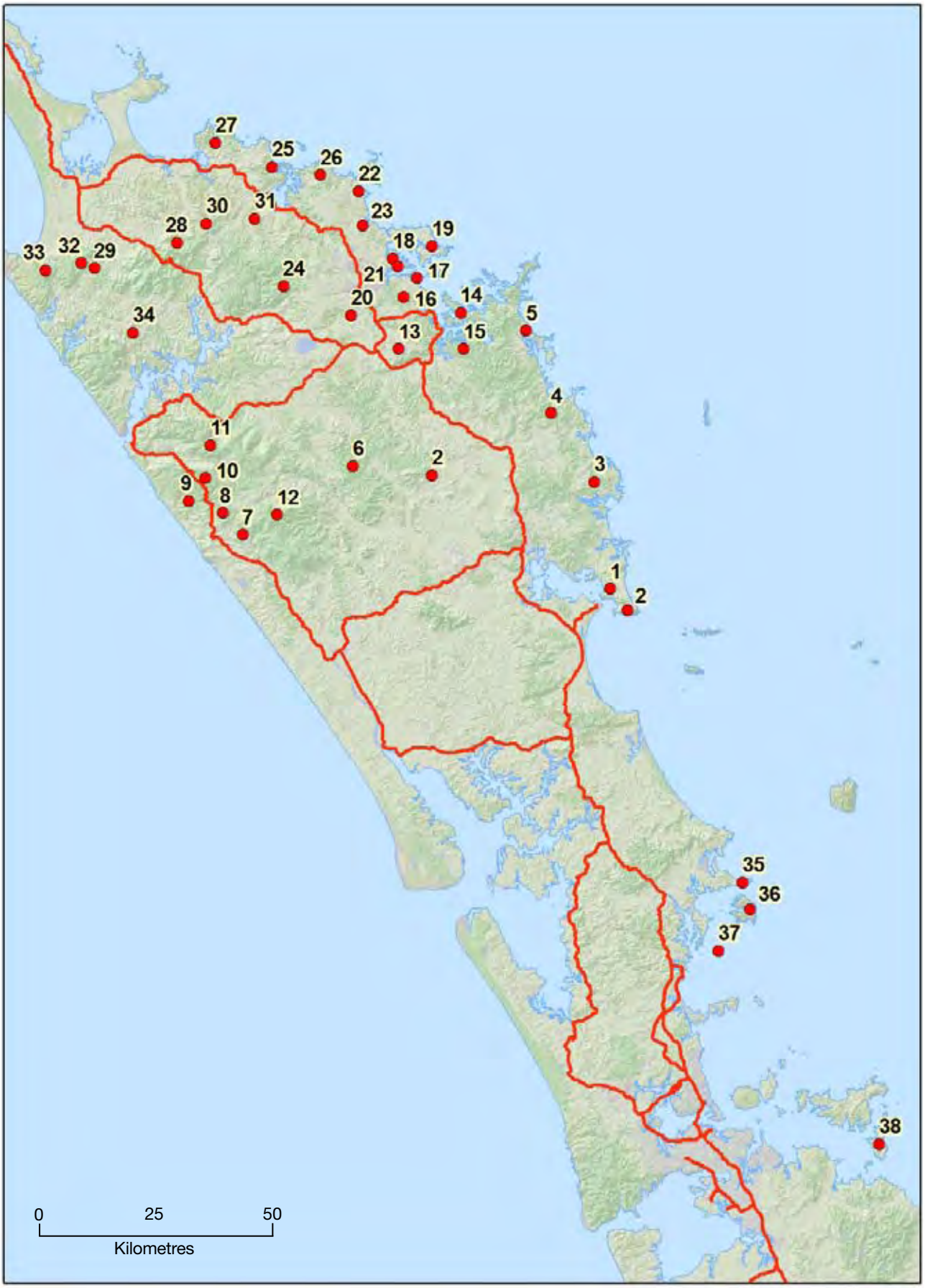

Figure 3. Northland kiwi recovery projects. The sites shown on this map are listed in Table 1.

Table 1. Key for Northland kiwi recovery projects.

1	Whangarei Heads Landcare Forum
2	Department of Conservation—Whangarei Kiwi Sanctuary
3	Ngunguru—Tutukaka Landcare Coalition
4	Department of Conservation—Mimiwhangata
5	Taupiri and Elliots bay—NZ Kiwi Foundation
6	Pipiwai—Hancocks Forest
7	Department of Conservation—Trounson Kauri Park
8	Waipoua Forest Trust
9	Department of Conservation—Waipoua
10	Wekaweka Landcare Group
11	Te Mahurehure Roopu Whenua Taonga Trust
12	Opouteke—Hancocks Forest
13	Hupara Landcare Group
14	Department of Conservation, Russell Landcare Group and NZ Kiwi Foundation
15	Waikino Landcare Group
16	Department of Conservation—Waitangi Forest
17	Wharau Road—NZ Kiwi Foundation
18	Kerikeri Peninsula—NZ Kiwi Foundation
19	Purerua Peninsula—NZ Kiwi Foundation
20	Waimate North Landcare
21	Aroha Island Charitable Trust
22	Kauri Cliffs—NZ Kiwi Foundation
23	Takou Were to Mokai Trust/NZ Landcare Foundation
24	Puketi Forest Trust
25	Taupo Bay Landcare
26	Mahinepua, Radar Hill Landcare
27	Whakaangi Landcare Trust
28	Wells Road—Higginson/Khaine
29	Herekino—Sporle/Renwick
30	Honeymoon Valley and Puhoi (Native Forest Restoration Trust)
31	Kohumaru
32	East Herekino—NZ Landcare Foundation
33	Herekino Landcare
34	Humphries Road—Blunden
35	Tawharanui Open Sanctuary (ARC TOSSI)
36	Kawau Island
37	Motuora Island (Department of Conservation and Motuora Restoration Society)
38	Ponui Island—Massey University

Another management tool is kōhanga kiwi, which are sites under intensive management that are able to be used as a source population. Adult kiwi or chicks are translocated to establish new populations or supplement existing populations. The WKS is currently the only kōhanga kiwi for Northland brown kiwi.

3.6.7 Kiwi aversion training for dogs

All dogs are a threat to kiwi, regardless of breed, temperament, and training. The most effective way of preventing a dog from attacking a kiwi is to ensure it never comes into contact with kiwi, and the easiest way to achieve this is to keep dogs out of kiwi habitat at all times. However, this is not always possible, particularly in Northland where kiwi habitat is fragmented and forms a patchwork within farmland. In some situations, dogs may live or need to work in or near kiwi habitat. For these dogs and their owners, kiwi aversion training for dogs is a useful tool.

Kiwi aversion training for dogs 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 on the dog via a collar if it approaches or shows any interest in the stimulus. It is recommended that dogs are tested 6 months after their initial training, and if they demonstrate aversion, further testing can be

carried out annually. Kiwi aversion training for dogs also provides an important opportunity for the trainer to share information with dog owners about ways to reduce the chances of dogs coming into contact with kiwi.

At the time of publication, there were four kiwi aversion dog trainers in Northland, and several thousand dogs from throughout Northland had been put through the programme.

3.6.8 Mainland islands and mainland restoration projects

Trounson Kauri Park is one of six official mainland island projects managed by DOC and is a 445-ha mixed, old-growth kauri, podocarp and broadleaf forest surrounded by 100 ha of Crown-owned, leased farmland. The park undertakes scientific research to develop and assess tools for managing threats. Trounson Kauri Park has extensive trapping and toxin use for the control of possums, rats, cats and mustelids, which protects kiwi. Kiwi dog surveys undertaken in 2007 recorded one pair every 7.1 ha, giving an estimate of 66 pairs within the park (Natasha Coad pers. comm.).

Tawharanui Open Sanctuary is a 588-ha mainland restoration area formerly administered by the Auckland Regional Council (now Auckland Council) with volunteer assistance from the Tawharanui Open Sanctuary Society Inc (TOSSI). The sanctuary comprises a narrow peninsula with a coast-to-coast predator fence that was completed in 2004. Most introduced mammals have been removed from the sanctuary with the exception of hedgehogs, mice and rabbits, but continued pest control is needed to avoid reinvasion. Northland brown kiwi were first introduced in 2006 using BNZONE kiwi of WKS origin crèched on Motuora Island. Subsequent transfers have been carried out and a successful breeding population is now establishing.

3.6.9 Offshore islands

Translocations of Northland brown kiwi to offshore islands began in the 1890s, with the transfer of birds to Kawau Island. Subsequent populations of Northland brown kiwi have been established on a further eight islands. Not all populations are actively managed, nor are they all on public conservation land. Several islands have supporters' groups that assist DOC with fundraising, island maintenance and enhancement. Figure 4 shows Northland's offshore island kiwi populations.

Island populations and island crèche sites

ISLAND POPULATIONS

Kawau Island—2050 ha. Governor Grey transferred Northland brown kiwi from the Hokianga area to Kawau Island in the mid–late 1800s, 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 (resident or visiting) is also prevalent.

Motukawanui Island (also known as Great Cavalli)—380 ha. This population was established as a BNZONE trial site. Initially, ten kiwi were transferred to this predator-free island in 1995. The island currently supports a breeding population estimated at 50–60 birds. Motukawanui is used as a refuge for Northland brown kiwi, including those salvaged as eggs from throughout Northland (Colbourne 2005).

Moturoa Island—157 ha. Six Northland brown kiwi were introduced to Moturoa 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.

Moturua Island—163 ha. This population was founded using Bay of Islands kiwi rescued from forestry land harvested in the early 1980s. Despite the presence of predators, including stoats, 30–40 kiwi were present in 2006.

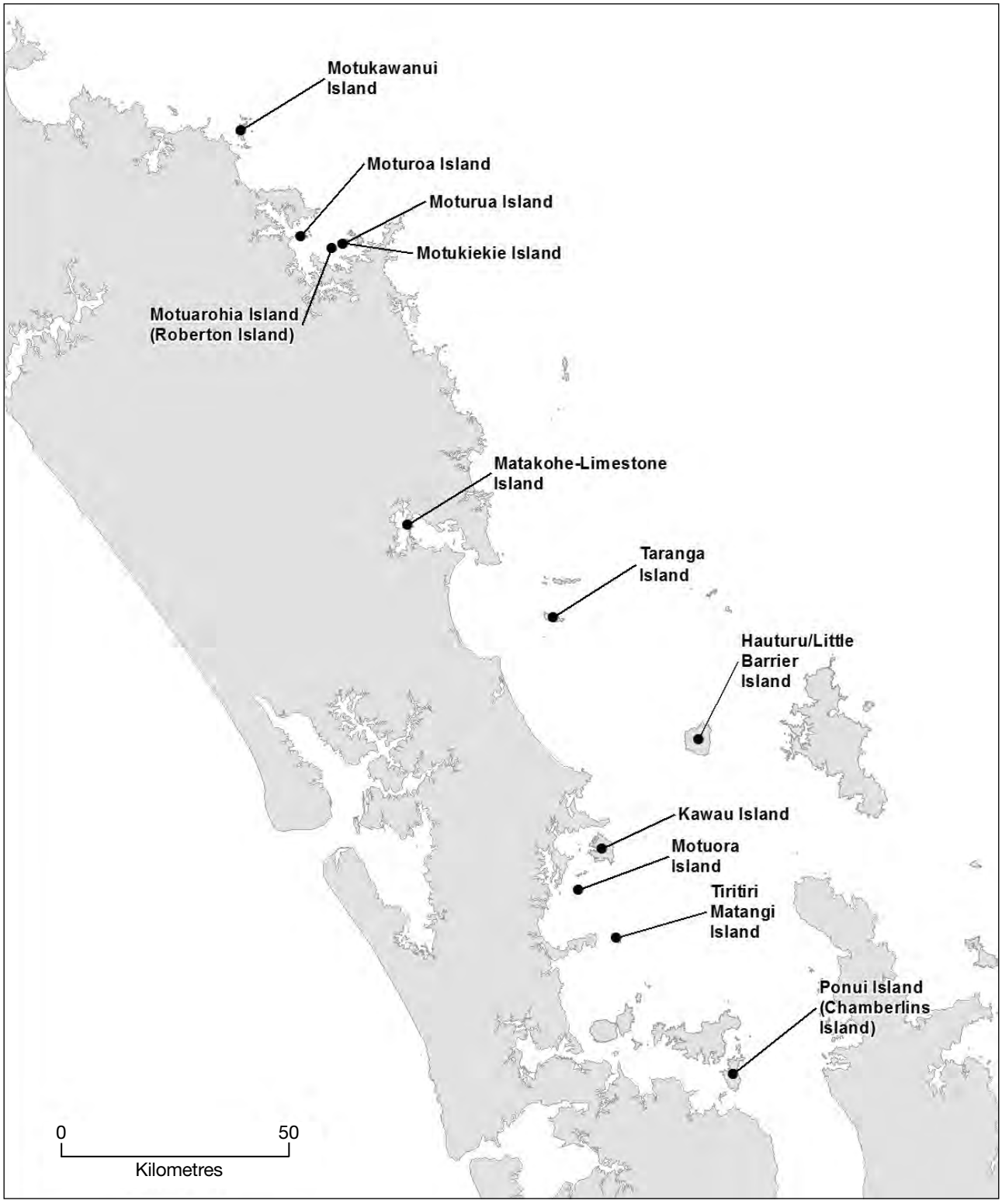

Figure 4. Offshore island kiwi populations (based on Fig. 4 in Colbourne 2005).

Motuarohia Island—66 ha. This population was also founded with Bay of Islands kiwi rescued from forestry land harvested in the 1980s. The current population estimate is 17 pairs, originating from one pair and an individual. The island is privately owned by five owners who are collectively undertaking its ecological restoration. Dogs and cats are banned.

Motukiekie Island—34 ha. A small population of kiwi were possibly translocated here in the mid-1980s, although this cannot be confirmed. It is unknown whether they are still present on the island.

ISLAND CRÈCHES

Matakohe-Limestone Island—38 ha. The first BNZONE chicks were transferred here in 2001, and it continues to be used for translocations of wild-caught WKS chicks or WKS eggs hatched at the Whangarei Native Bird Recovery Centre. Once the chicks weigh more than 1200 g, they are transferred to the Whangarei Heads area of the WKS to supplement the existing population. Predator control is carried out on Matakohe-Limestone Island as well as on neighbouring islands and headlands, as they are within swimming distance for stoats. The resident rangers and Friends of Matakohe-Limestone Island (FOMLI) play an important role in the management and enhancement of this island.

Motuora Island—85.5 ha. The first four BNZONE chicks were transferred here in 1999 after hatching at Auckland Zoo. Once these kiwi weigh 1200 g or more they are transferred to the WKS or to Tawharanui Open Sanctuary. The island is predator-free, and the Motuora Island Restoration Society oversees its ecological enhancement.

MIXED-PROVENANCE ISLAND POPULATIONS

Ponui Island—1770 ha. This privately owned island has brown kiwi that are mixed-provenance Northland and Hauturu/Little Barrier Island birds (the Hauturu/Little Barrier Island kiwi are western brown kiwi taxon). Despite the presence of stoats and rodents, kiwi are present at high densities; as many as ten pairs every 100 ha. The population is estimated to be as high as 350 birds and the island is thought to have reached carrying capacity (R. Colbourne pers. comm.). Origins of this population stem from six kiwi from Hauturu/Little Barrier Island and eight from Waipoua forest that were transferred by the Wildlife Service in 1964 (D. Merton, pers. comm. in Colbourne 2005). Given that this is a mixed-provenance population, its future management is complex and requires discussion.

3.6.10 Research

Research undertaken at a national level and within the range of Northland brown kiwi has significantly increased understanding of the management needs of this taxon. Research has contributed to increased understanding of Northland brown kiwi ecology and behaviour, taxonomy, biology and reproduction, agents of decline, population distribution and trends, predator control techniques, habitat requirements and effectiveness of advocacy.

Habitat management areas such as the WKS and Trounson Kauri Park provide important sites for research and management trials. Population modelling and trials of predator control techniques are in progress at these sites. Research into habitat requirements at the WKS has provided valuable information; for example, some kiwi were found to have territories exclusively within farmland and to carry out all life functions there, including breeding (Hugh Robertson, pers. comm. in Colbourne 2005).

The large numbers of individual landowners in Northland who are trialling and developing predator control methods, and DOC's rigorous testing of new methods, have proved to be important factors in the development of pest control best practice.

3.7 Cultural importance

Kiwi have a special significance to all New Zealanders; they are a national icon and unofficial national emblem.

Kiwi are a taonga species to Māori, who have a strong cultural, spiritual and historic relationship with them. Kiwi are recognised as one of the children of Tāne, the god of the forest, and were highly valued as food, and reserved for rangatira. There are many Maori proverbs, songs and poetry related to the qualities and life of the kiwi. Kiwi feather cloaks were rare and treasured. The decline in kiwi populations is reflected in the decline in Mātauranga Māori relating to the kiwi. With kiwi now strictly protected, weavers must obtain their feathers with the permission and assistance of DOC, although some hapu strive to manage this taonga themselves.

A large number of iwi have kiwi present (or historically present) within their rohe, and tangata whenua are involved in kiwi recovery throughout Northland. Predator control to protect native species including kiwi is being undertaken by tangata whenua at Motatau and Waima. Tangata whenua also undertake kiwi protection in the Takou Bay area, and others have expressed interest in establishing similar projects.

As advocacy and active management are best carried out by local people in a culturally appropriate manner, tangata whenua have an important role to play in dog control and kiwi protection advocacy.

Northland brown kiwi are highly valued by the local community. Many people live in close proximity to populations of Northland brown kiwi and recognise their role and responsibilities as guardians/kaitiaki of the taxon.

3.8 Public awareness, key stakeholders and associates

The management of Northland brown kiwi is a collaborative effort between DOC, tangata whenua, BNZSKT, NZ Landcare Trust, Queen Elizabeth II National Trust, the NZ Kiwi Foundation, captive facilities, research organisations, landcare and community groups, individuals and councils. DOC and the other agencies provide technical advice and information, with community groups and individual landowners undertaking much of the active management and protection. The key stakeholders for Northland brown kiwi are described in more detail in Appendix 2.

3.9 Recovery principles and preferred option for recovery

The goals, objectives and actions in this plan are directed by the following underlying recovery principles and preferred option of recovery contained in the Kiwi Recovery Plan (2008–2018):

- Prevention of extinction of any species of kiwi as the highest priority
- Intraspecific 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 to be managed within their natural (prehistoric or historic) 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 is to sustainably manage kiwi in their natural range by reducing their exposure to predators.

4. Goals

4.1 Long-term recovery goal

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

4.2 Goals for the term of this taxon plan

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 Northland brown kiwi populations in the wild.

Goal 1.3: To control threats at all managed sites with greater than 200 pairs of Northland brown kiwi.

Goal 1.4: To control threats at a minimum of six sites with 50 to 200 pairs of Northland brown kiwi, and/or where BNZ Operation Nest Egg™ (BNZONE) is complementing the population.

Goal 1.5: To secure a minimum of 1600 breeding pairs of Northland brown kiwi from threats.

Goal 1.6: To expand and connect Northland brown kiwi habitat and population clusters at a minimum of two key protected sites.

Goal 1.7: To restore Northland brown kiwi to at least two new areas within their former range.

Goal 1.8: To further develop and refine tools to minimise the impact of dog predation on Northland brown kiwi populations.

Note: The baseline for Goals 1.1 and 1.2 is the current (2010) estimated population size and distribution. Goal 1.3 will secure a representative population in each of the northern, western, eastern and southern areas of current Northland kiwi concentrations.

Community relations and engagement

Goal 2.1: To actively engage with, and provide for, tangata whenua involvement in the kaitiaki and management of Northland brown kiwi.

Goal 2.2: To share best practice and technical information amongst Northland brown kiwi stakeholders to optimise recovery efforts.

Goal 2.3: To sustain and increase community-led projects for Northland brown kiwi.

Goal 2.4: To establish a Northland Kiwi Forum to facilitate implementation of this plan.

Goal 2.5: To increase awareness of the threat of dogs to kiwi, including via kiwi aversion training for dogs, and the use of a marketing campaign.

Goal 2.6: To increase education and advocacy opportunities for Northland brown kiwi conservation.

Research, monitoring and innovation

Goal 3.1: To support research into clarifying brown kiwi taxonomy, and manage Northland brown kiwi according to research findings.

Goal 3.2: To undertake and/or support new initiatives in predator control and habitat management and enhancement.

Goal 3.3: To ascertain carrying capacity of Northland brown kiwi.

Goal 3.4: To develop strategies to prevent genetic bottlenecks with Northland brown kiwi.

Goal 3.5: To undertake and/or support research into improving dog control techniques including kiwi aversion training for dogs and dog toxins.

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

Goal 3.7: To promote and support the use of kiwi best management practices by the forestry and farming sectors.

5. Implementation

This section provides short-term direction for DOC and community group managers by identifying:

- What is going to happen
- Who is going to do it
- Where it is going to happen
- When it is going to happen

Three themes (management; community relations and engagement; research, monitoring and innovation) with a number of topics have been prepared. Each topic outlines issue(s) and objective(s), and presents an action table showing how to resolve the issue(s).

All action tables indicate which groups or individuals are accountable for the delivery of each action.

All actions have been prioritised and timelined. A summary table of actions is provided as Appendix 3. Action priorities have been assigned as follows:

- **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 timelined 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 2014.

5.1 Management

In Northland, recovery efforts for kiwi have historically focussed on the protection of kiwi as the target species. However, in recent times, management has become more ecosystem-focussed where kiwi habitat is managed to the benefit of all indigenous species present. To date, there are approximately 52 000 ha of habitat under active management for Northland brown kiwi, supporting more than 1000 breeding pairs.

A variety of people, groups and organisations are involved in the protection of Northland brown kiwi over a variety of habitat types. 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 protected areas.

Topics

5.1.1 Topic 1: Support strategies

Background

It is important that the strategy for Northland brown kiwi recovery is understood by all people involved in kiwi management. This strategy needs to be regularly reviewed and communicated to ensure that the goals remain relevant and are achieved. A Northland Kiwi Forum would assist Northland kiwi projects to apply objectives and actions of the taxon plan to their projects. It would also provide best practice information and support, and an avenue for information flow between the Kiwi Recovery Group and individual kiwi projects.

Issues

- The delivery of the following action points will require a shared effort and is subject to available resources.
- As knowledge grows and results are achieved, this plan will need to be reviewed and adapted to avoid becoming obsolete and irrelevant.
- Efforts must be coordinated and information communicated to ensure benefits are optimised.
- The successful recovery of Northland brown kiwi is dependent upon stakeholders working together. It is critical that tangata whenua-led initiatives, community-led initiatives and involvement of private landowners are well supported.

Objectives and actions

Taxon plan objective(s)				
Objective 1.1: To establish a review process which ensures that the taxon plan for Northland brown kiwi remains relevant and effectively informs annual work plans. **Objective 1.2:** To involve key agencies, groups and individuals in the taxon plan implementation and review. **Objective 1.3:** To ensure groups and individuals involved in Northland brown kiwi recovery are well supported and informed.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
1.1	Northland brown kiwi taxon plan completed to DOC Conservator approval.	2011	Essential	DOC
1.2	Undertake full review of recovery progress and application of taxon plan at half way point of current plan (2011–2019).	2015	Essential	DOC/Northland Kiwi Forum

Continued on next page

Topic 1 objectives and actions continued from previous page

1.3	Northland Kiwi Forum formed to participate in the facilitation, implementation, review and maintenance of the Northland brown kiwi taxon plan.	2011	Essential	Northland Kiwi Forum
1.4	Northland Kiwi Forum representatives will meet biannually, in March and September.	Biannually from 2011	Essential	Northland Kiwi Forum
1.5	The Northland Kiwi Forum will ensure relevant information regarding kiwi management is available to all stakeholders.	Throughout	High	Northland Kiwi Forum
1.6	Establish and secure resourcing for an administrator role within the Northland Kiwi Forum.	2011	Medium	Northland Kiwi Forum/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), the Brown Kiwi Husbandry Manual (Fraser & Johnson 2009), various captive management plans, and pest and predator control guidelines (all available from DOC and/or www.savethekiwi.org.nz). These manuals are updated regularly as new information becomes available.

Issues

- Supporting documents relevant to Northland brown kiwi recovery need to be kept up to date.
- Best practice information and techniques need to be available and referred to regularly by all working with and around kiwi.
- Monitoring and data collection is vital to the ongoing development of best practice. All projects should be supported to provide this information.

Objectives and actions

Taxon plan objective(s)				
Objective 2.1: To ensure that management of Northland brown kiwi is undertaken to a consistently high standard. **Objective 2.2:** To ensure that best practice information is current and accessible to all working with and around kiwi. **Objective 2.3:** To ensure that accurate and reliable data is collected from as many Northland brown kiwi projects as possible.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
2.1	Ensure best practice is promoted 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	DOC/Northland Kiwi Forum
2.3	Provide regular pest control workshops to those implementing field programmes.	Annually	High	DOC/NZ Landcare Trust/Northland Kiwi Forum
2.4	Provide a regular Northland brown kiwi taxon hui.	Biennially from 2012	High	DOC/Northland Kiwi Forum
2.5	Distribute national monitoring and data collection templates.	Throughout	High	DOC/Northland Kiwi Forum

The following action also contributes to meeting the above objectives:
Action 13.4—see Section 5.2.1

5.1.3 Topic 3: Whangarei Kiwi Sanctuary (WKS)

Background

The WKS is important to the population recovery of Northland brown kiwi. When the WKS 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 trapping and toxins, using BNZONE, and undertaking substantial public advocacy. The research and practical management techniques utilised and developed in the WKS have helped to facilitate refinement of best practice. In addition to site-specific kiwi protection, the WKS has been a critical site for national research into kiwi ecology and protection, and for the development of new management techniques.

Issues

- Maintaining relationships and supporting landcare groups working on private land within the WKS is vital to the success of the sanctuary
- Despite ongoing public advocacy, dog predation remains a significant threat to kiwi populations within the WKS
- Further research is required to determine the optimal frequency of stoat trap servicing
- The WKS includes several habitat patches scattered over a large geographical area, and each patch has unique features and issues

Objectives and actions

Taxon plan objective(s)				
Objective 3.1: To ensure the WKS continues to be an integral part of Northland brown kiwi recovery. **Objective 3.2:** To reduce kiwi deaths from dog predation within the WKS area.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
3.1	Assess the potential for establishment of ecological corridors between WKS areas and develop a strategy for establishing these.	2011	Medium	DOC
3.2	Continue to improve and refine stoat and other predator control methods in the WKS.	Throughout	Essential	DOC
3.3	Maintain relationships with and support tangata whenua, landcare groups and surrounding landowners associated with the WKS.	Throughout	Essential	WKS staff/ tangata whenua/ landcare groups/ landowners.
3.4	Communicate with other sanctuary staff throughout the country with regular debriefs/networking events.	Throughout	Medium	DOC
3.5	Implement a marketing campaign to increase awareness of the impact of dogs on kiwi, with the aim of reducing this impact.	2011	Essential	WKS
3.6	Contribute to the development of a national database for kiwi projects.	2011	High	WKS

5.1.4 Topic 4: Island strategy

Background

Since the 1890s, conservation management of Northland brown kiwi has included 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 nine islands throughout the Northland and Auckland regions that contain populations of Northland brown kiwi (including mixed-provenance birds on Ponui Island). Six of these islands are privately owned and have a permanent human population. Four are less than 100 ha in size (100 ha is generally considered a minimum suitable for kiwi). Introduced mammalian predators (including stoats) are present on several islands. Tangata whenua, community and supporters groups play a critical role in the maintenance and management of several of these islands.

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
- The carrying capacity and impact of genetic bottlenecking on these islands is not known
- Predators are still present on, and negatively impacting the ecosystems of many of these islands
- Island landowners and residents active in kiwi management need support and recognition for their kiwi recovery efforts

Objectives and actions

Taxon plan objective(s)				
Objective 4.1: To optimise the use of offshore islands for Northland brown kiwi recovery.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
4.1	Develop an island strategy for Northland brown kiwi that is consistent with the proposed National Island Strategy for kiwi.	2011	Essential	KRG/DOC/ Northland Kiwi Forum
4.2	Ascertain population estimates for all islands containing Northland brown kiwi.	2013	Medium	DOC/Northland Kiwi Forum
4.3	Provide technical support and networking for landowner/occupiers with island kiwi populations.	Throughout	Medium	DOC/Northland Kiwi Forum
4.4	Use advocacy to minimise the risk of predation to all offshore island kiwi populations.	Throughout	High	Northland Kiwi Forum
4.5	Advocate for dog control and offer kiwi aversion training for dogs where dogs are present on islands.	Throughout	Essential	Northland Kiwi Forum

5.1.5 Topic 5: Island biosecurity

Background

Offshore islands play a part in the recovery planning for Northland brown kiwi. The abundance of kiwi on islands is predominantly determined by the presence and abundance of threats on these islands, especially predators, competitors and, to a lesser degree, diseases. Biosecurity plans for these islands will help reduce the effects of existing threats, and minimise the risk of new threats becoming established.

Issues

- Kiwi populations on islands could be jeopardised by new threats, or by an increase in the range or abundance of existing threats

Objectives and actions

Taxon plan objective(s)				
Objective 5.1: To maintain or improve the current status of threats to kiwi on islands with kiwi populations.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
5.1	Develop, maintain and implement island biosecurity plans (including contingency plans) and protocols for islands with Northland brown kiwi.	2011	Essential	DOC/Northland Kiwi Forum

5.1.6 Topic 6: Population recovery

Background

An important step in the recovery of all kiwi taxa is to provide sustained protection for a minimum number of pairs, while other recovery efforts are implemented. Such 'secure 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 taxon. 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. Enhancing and sustaining these populations is the current challenge (Pierce et al. 2006).

Issues

- Most of the 38 managed sites in Northland could potentially support populations of 500+ pairs (Pierce et al. 2006)
- Protecting 500 pairs at each site is unrealistic due to limited resources

Objectives and actions

Taxon plan objective(s)				
Objective 6.1: 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 6.2:** To secure an additional six sites with populations between 50 and 200 pairs of Northland brown kiwi under sustained permanent protection. **Objective 6.3:** To secure a further 15 sites throughout the known and historical range of Northland brown kiwi, and establish habitat corridors, where possible.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
6.1	Identify 500 pairs (e.g. 125 pairs across four sites) to be protected under sustained management as a minimum secure population in the advent of a sudden population decline.	2011	Essential	DOC
6.2	Protect a minimum of 1600 breeding pairs of kiwi across a minimum of four managed sites by 2019, and work towards expanding those areas with habitat corridors.	2019	Essential	DOC/Northland Kiwi Forum

Continued on next page

Topic 6 objectives and actions continued from previous page

6.3	Identify and protect at least six sites where between 50 and 200 breeding pairs are currently present, and double those populations by 2019.	2019	Essential	DOC/Northland Kiwi Forum
6.4	Identify and secure a minimum of 15 additional sites under effective management and work towards expanding those areas with habitat corridors.	2013	Essential	DOC/Northland Kiwi Forum
6.5	Work closely with tangata whenua- and community-based projects to aid population recovery.	Throughout	Essential	DOC/Northland Kiwi Forum

5.1.7 Topic 7: Declining populations

Background

All four brown kiwi taxa remain threatened. Where populations of Northland brown kiwi are under secure protection, annual increases of up to 9% have been recorded. However, only about 20% of Northland brown kiwi are currently under management.

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

Issues

- Current management has stabilised the Northland brown kiwi population overall, but with a reduced distribution and population density than in the past
- The potential and actual carrying capacity of Northland brown kiwi is poorly understood
- There is currently no strategy that addresses the management of scattered, isolated birds

Objectives and actions

Taxon plan objective(s)				
Objective 7.1: To halt the decline of Northland brown kiwi. **Objective 7.2:** To manage a sufficient proportion of the Northland brown kiwi taxon to ensure that recruitment exceeds mortality.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
7.1	Apply landscape-scale integrated predator control, targeting mustelids and cats, at the sites with greatest potential gain.	Throughout	Essential	DOC/Northland Kiwi Forum/kiwi projects
7.2	Establish a regime for managing small and/or isolated populations.	2013 and beyond	High	KRG/DOC/ Northland Kiwi Forum

The following actions also contribute to meeting the above objectives:
Action 12.2—see Section 5.1.12
Action 19.1—see Section 5.3.2
Action 19.2—see Section 5.3.2
Action 19.5—see Section 5.3.2
Action 19.9—see Section 5.3.2

5.1.8 Topic 8: Distribution and genetic diversity

Background

Loss of genetic variability can lead to inbreeding and reduced fitness, resulting in poor species health, lowered levels of fertility, the inability to respond to environmental change and disease, and, potentially, extinction.

The Northland brown kiwi population has been reduced significantly, in terms of both distribution and population density. The resulting isolated population clusters can lead to a loss of genetic diversity. Natural and artificial barriers to dispersal are also exacerbating the 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.

Maintaining or enhancing the distribution of Northland brown kiwi populations and the preservation of their genetic variation is of lower priority compared with other recovery objectives in this taxon plan. However, a precautionary principle should be applied to management until the genetic status of this taxon is fully understood. Further genetic analysis is required to resolve the level of divergence between brown kiwi populations to confirm appropriate conservation management units. Maintaining genetic diversity is also an important consideration when undertaking translocations and establishment of new populations.

The destruction and degradation of kiwi habitat remains a key issue because of increasing development pressure and ongoing unsustainable land management practices. Fragmentation of remaining areas of habitat leads to isolation of kiwi populations and individuals which inhibits dispersal, fertility and gene flow.

Issues

- There is a continued reduction in the distribution of Northland brown kiwi
- Fragmented habitat, and natural and artificial barriers are limiting the dispersal of Northland brown kiwi throughout the region
- The taxonomy of all brown kiwi taxa requires further investigation
- Kiwi utilise a variety of habitats at different life stages
- Unsustainable land management practices can threaten and kill kiwi
- Isolation of habitat patches reduces dispersal of kiwi and gene flow

Objectives and actions

Taxon plan objective(s)				
Objective 8.1: To manage Northland brown kiwi and their habitat over as much of their historical range as possible. **Objective 8.2:** To maintain the genetic integrity of Northland brown kiwi. **Objective 8.3:** To restore Northland brown kiwi populations within their former range. **Objective 8.4:** To facilitate Northland brown kiwi dispersal and gene flow throughout their current and historical range, through habitat enhancement.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
8.1	Identify and establish a minimum of two reintroduction sites within the former extent of the Northland brown kiwi range.	2019	Medium	DOC/Northland Kiwi Forum/KRG
8.2	Maximise opportunities to establish corridors between managed sites of Northland brown kiwi habitat (refer to Pierce et al. 2006).	2019	High	DOC/Northland Kiwi Forum

Continued on next page

Topic 8 objectives and actions continued from previous page

8.3	Support and/or undertake further surveys to conclusively identify the extent of Northland brown kiwi distribution.	2013	Medium	DOC/Northland Kiwi Forum
8.4	Manage Northland brown kiwi to maintain fine-scale diversity by minimising translocations between geographic extremes and natural boundaries.	Throughout	Essential	DOC

The following actions also contribute to meeting the above objectives:
Action 4.1—see Section 5.1.4
Action 7.2—see Section 5.1.7
Action 16.7—see Section 5.2.4
Action 18.1—see Section 5.3.1

5.1.9 Topic 9: Mixed-provenance populations

Background

Ponui Island contains a population of mixed-provenance Northland brown kiwi and Hauturu/Little Barrier Island kiwi (the Hauturu/Little Barrier Island kiwi are western brown kiwi taxon). The population was established in the 1960s, before the importance of genetics and population variation was understood. The population is currently thought to have reached carrying capacity (R. Colbourne pers. comm.), which is evidenced by 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. The risks and opportunities that the Ponui Island population present need to be determined.

Issues

- The mixed-provenance population on Ponui Island has likely reached carrying capacity
- Reducing the population on Ponui Island may improve the overall health of the population until such time that it reaches carrying capacity again
- Naturally-occurring, mixed-provenance zones are not known, nor are historical boundary lines, if any, between Northland, Coromandel and western brown kiwi taxa
- Any translocation of kiwi from Ponui Island should be managed to ensure the chances of them dispersing to meet single provenance mainland populations are minimised
- The risks of establishing a mixed-provenance mainland population should be assessed and weighed against the opportunities
- It is debatable whether the Ponui birds warrant the investment of funds that would otherwise be spent on single provenance mainland populations

Objectives and actions

Taxon plan objective(s)				
Objective 9.1: To develop a management strategy for the Ponui Island population and, if appropriate, utilise this population as a source for translocation to designated mixed-provenance zones.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
9.1	Prepare a management plan for the Ponui Island mixed-provenance birds, addressing both short- and long-term implications for this population. This should be considered as part of a national mixed-provenance plan.	2011	High	KRG
9.2	Consider the management plan for Ponui Island kiwi in the Northland brown kiwi taxon plan review.	2014	Essential	DOC/Northland Kiwi Forum/ Massey University/ landowners

5.1.10 Topic 10: 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 BNZONE.

Captive institutions are an important tool for kiwi recovery and play a vital role in kiwi advocacy by providing an opportunity for the general public to view live kiwi and understand their conservation needs. Auckland Zoo, Whangarei Museum and Whangarei Native Bird Recovery centre are currently the only captive facilities within the natural range of Northland brown kiwi. Both Auckland Zoo and the Whangarei Native Bird Recovery Centre are involved in BNZONE.

Captive institutions holding kiwi must have permits from DOC and are guided by the Kiwi Captive Management Plan (KCMAC & DOC 2004) and the Brown Kiwi Husbandry Manual (Fraser & Johnson 2009).

Issues

- The advocacy messages at captive institutions need to be accurate and consistent
- Best practice needs to be communicated and accepted by the captive industry
- Captive institutions and kiwi projects can increase communication and opportunities to work together

Objectives and actions

Taxon plan objective(s)				
Objective 10.1: To optimise the role of the captive industry in Northland brown kiwi recovery. **Objective 10.2:** To ensure that best practice for captive husbandry of Northland brown kiwi, including minimum standards, is collated, communicated efficiently and implemented.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
10.1	Actively involve representatives from captive facilities holding Northland brown kiwi in kiwi recovery and in the Northland Kiwi Forum.	Throughout	Essential	Northland Kiwi Forum

Continued on next page

Topic 10 objectives and actions continued from previous page

10.2	Encourage captive institutions to deliver accurate and consistent advocacy messages.	Throughout	High	Northland Kiwi Forum
10.3	Include implementation of best practice as described in the kiwi captive husbandry manual as part of the permit conditions for captive facilities.	Throughout	Essential	Northland Conservator/ Captive Institutions

5.1.11 Topic 11: BNZ Operation Nest Egg™

Background

BNZ Operation Nest Egg™ (BNZONE) was established in 1994 using funding from the BNZ. 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 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). BNZONE results in egg and chick survival rates that are significantly higher than in the wild.

Alternatives to BNZONE include allowing chicks to hatch in the wild, and transferring them to a crèche site once they become independent (10–20 days old); or translocating juvenile and adult kiwi that are under threat to managed sites.

Despite the high financial cost of BNZONE, the benefits to kiwi recovery have been well demonstrated and the positive advocacy opportunities are immense. The use of BNZONE and chick translocations as an advocacy tool has proven to be excellent for building critical conservation linkages between DOC, tangata whenua, local schools, local communities and captive-breeding institutions, and is an excellent vehicle for highlighting threats to kiwi in the media (Robertson & Colbourne 2003). It is also a valuable tool for advocating dog control messages.

Issues

- National data on the use and success of BNZONE is not available.
- The use of BNZONE lacks national coordination.
- Though BNZONE does not degrade habitat, its use does not benefit other threatened species. In some cases funding may be better spent on predator control and habitat corridors.
- Direct translocation of chicks, juveniles and adult kiwi from a vulnerable site to a managed site may be a more cost-effective technique than BNZONE.
- There is currently no plan for the number of crèche sites or incubation facilities that are required for BNZONE (Holzapfel et al. 2008).
- The use of BNZONE has potential advocacy gains that also need to be considered.

Objectives and actions

Taxon plan objective(s)				
Objective 11.1: To ensure that the use of BNZONE is effective and undertaken to sufficient standard for the recovery of the Northland brown kiwi taxon. **Objective 11.2:** To optimise the advocacy opportunities BNZONE provides.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
11.1	Ensure that BNZONE minimum standards are followed by all Northland brown kiwi BNZONE projects.	Throughout	Essential	DOC/Northland Kiwi Forum

Continued on next page

Topic 11 objectives and actions continued from previous page

11.2	Apply Kiwi Recovery Group guidelines for when and where to use BNZONE.	Throughout	High	Northland Kiwi Forum
11.3	Provide recommendations to the Kiwi Recovery Group on the development of a 10-year plan for BNZONE, including the number and location of incubation facilities, crèche sites and kōhanga kiwi for Northland brown kiwi.	2011	High	DOC/Northland Kiwi Forum
11.4	Support the use of BNZONE advocacy opportunities as part of a projects management tools, but not kiwi handling for advocacy purposes alone.	Throughout	Medium	DOC/Northland Kiwi Forum

5.1.12 Topic 12: Kiwi crèches and kōhanga kiwi

Background

Kiwi crèche is a term used for an intensively-managed, predator-free area where captive-hatched chicks can grow to a weight at which they are more able to resist stoat predation (≥ 1200 g) before being released onto the mainland. There are two crèche sites for Northland brown kiwi: Matakohe-Limestone Island and Motuora Island. These sites are primarily used for kiwi from the WKS.

Kōhanga kiwi are sites where intensive management allows kiwi populations to grow 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 either to supplement existing populations or establish new ones. There is currently one kōhanga kiwi site for Northland brown kiwi at the WKS. Further kōhanga kiwi sites are proposed by Tawharanui Open Sanctuary, Whakaangi Landcare Trust and the Whangarei Heads Landcare Forum.

Issues

- The adequate number and location of kiwi crèche and kōhanga kiwi sites for Northland has not been fully assessed
- Crèche demand will fluctuate
- Areas under predator management at which there are low densities of kiwi could benefit from supplementation to increase genetic diversity and kiwi abundance
- Crèches and kōhanga kiwi will be required for new populations planned throughout Northland and the greater Auckland region
- It will take time to establish kōhanga kiwi
- Currently, there are no kōhanga kiwi sites in the northern part of the region to be used as source populations for northern Northland projects
- There is a need to ensure that each proposed kōhanga kiwi management site is adequately supported in terms of resourcing and technical input and has sufficient genetic diversity (i.e. is based on enough founders) to be an appropriate source population for translocations

Objective(s) and actions

Taxon plan objective(s)				
Objective 12.1: To maintain adequate crèche capacity in Northland. **Objective 12.2**: To investigate the establishment of two further kōhanga kiwi sites, one in northern Northland and one in southern Northland.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
12.1	Maintain the current kōhanga kiwi site in Northland, and establish more, if needed.	Throughout	High	DOC
12.2	Maintain at least one kiwi crèche site for the WKS, and develop further kiwi crèche sites as required.	Throughout	Essential	DOC

The following action also contributes to meeting the above objectives:
Action 11.3—see Section 5.1.11

5.2 Community relations and engagement

The recovery and protection of Northland brown kiwi relies on the interest, understanding, engagement and collaboration of many sectors of the community. Many threats to kiwi survival are human induced, and their survival is today dependent on human action, such as controlling predators, and protecting and restoring habitat.

Numerous tangata whenua-, community- and landowner-led kiwi conservation projects have been successfully established within Northland. The long-term sustainability of these projects requires the ongoing energy and enthusiasm of the groups and individuals involved, and ongoing funding to sustain protection efforts. To date, support for these projects has come from DOC and BNZSKT, NZ Landcare Trust, NZ Kiwi Foundation and other organisations.

In general, there is a four-stage 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 make an actual difference

Topics

5.2.1 Topic 13: Advocacy

Background

Kiwi advocacy in Northland has progressed from raising awareness to facilitating joint protection efforts between DOC, 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 programmes. Target audiences include the general public, iwi, interest groups, the forestry and farming sectors, and statutory authorities.

Issues

- Advocacy messages are not always consistent
- People need to be engaged, motivated and empowered to become actively involved in kiwi protection
- Advocacy messages need to be innovative to reduce dog predation

- Northland tourism operators are being under-utilised as an advocacy source and a potential revenue generator for kiwi projects
- Forestry companies need to be engaged to provide kiwi safe forestry practices

Objectives and actions

Taxon plan objective(s)				
Objective 13.1: To motivate and empower people to have a positive impact on Northland brown kiwi recovery. **Objective 13.2:** To develop and apply innovative ideas to advocate dog control messages and methods which will reduce the impact of dogs on kiwi.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
13.1	Encourage people to become actively involved in Northland brown kiwi protection through advocacy programmes, e.g. workshops, training, support.	Throughout	Essential	Northland Kiwi Forum
13.2	Produce a regular newsletter to be distributed to all Northland brown kiwi projects and interested stakeholders.	Annually	High	Northland Kiwi Forum
13.3	Develop a Northland brown kiwi section within the BNZSKT website.	2011	Medium	Northland Kiwi Forum
13.4	Support all appropriate dog control advocacy programmes.	Throughout	Essential	DOC/Northland Kiwi Forum
13.5	Ensure that kiwi aversion training for dogs workshops optimise the advocacy opportunity.	Throughout	Essential	DOC/Northland Kiwi Forum
13.6	Support research into the potential benefits of eco-tourism for Northland brown kiwi.	Throughout	Medium	Northland Kiwi Forum

The following actions also contribute to meeting the above objectives:
Action 2.4—see Section 5.1.2
Action 16.3—see Section 5.2.4
Action 19.2—see Section 5.3.2

5.2.2 Topic 14: Tangata whenua

Background

Tangata whenua have a unique relationship with kiwi that is interwoven into genealogy and tradition, whakapapa and mauri. Tangata whenua are involved in most Northland brown kiwi projects. Kiwi are included in many iwi/hapū environmental policies and plans, and some iwi have established their own kaitiaki and kiwi protection projects. These include intensive pest control, habitat restoration including wilderness corridors and appropriate culverts, and advocacy efforts. The support of tangata whenua in all aspects of kiwi recovery is vital.

Issues

- Involvement by tangata whenua in aspects of kiwi management is variable across Northland
- The role of iwi in kiwi recovery planning and implementation, and access to cultural materials (kiwi feathers) via DOC, is not always understood or effectively provided for

Objectives and actions

Taxon plan objective(s)				
Objective 14.1: To encourage the increased involvement of tangata whenua in all levels of kiwi management and research in accordance with mātauranga Māori and tikanga. **Objective 14.2:** To support tangata whenua-led initiatives to actively protect kiwi.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
14.1	Support tangata whenua-led kiwi protection initiatives.	Throughout	Essential	DOC/Northland Kiwi Forum
14.2	Increase tangata whenua involvement in kiwi recovery.	Throughout	Essential	DOC/Northland Kiwi Forum
14.3	Ensure tangata whenua are involved in the Northland brown kiwi hui.	Biennially from 2012	High	DOC/Northland Kiwi Forum
14.4	Offer marae-based advocacy and kiwi aversion training for dogs.	Throughout	Essential	DOC/Northland Kiwi Forum
14.5	Continue to provide cultural materials (kiwi feathers) to groups/individuals as approved by the Pataka Komiti.	Throughout	Essential	DOC

5.2.3 Topic 15: Community and landowner-led initiatives

Background

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 habitat restoration, pest control and monitoring, access to resources and funding avenues, and assistance with administration and networking.

An increasing profile and greater understanding of the issues surrounding kiwi is leading to a considerable groundswell of support for their protection. Increasingly, individual landowners want to protect 'their kiwi' and, like larger community and landcare groups, they will also require support.

The allocation of funding is often based on a combination of factors including priority of population or management area, 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 an annual grant structure reduces the ability to plan long-term
- Work is 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 knowledge or capacity to access external funding providers
- It is not always easy to access the latest information, e.g. best practice, land management techniques and priority sites for kiwi protection
- The number of people wanting to help kiwi is increasing, which is stretching an already limited pool of available resources

- 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 provision of best practice information

Objectives and actions

Taxon plan objective(s)				
Objective 15.1: To ensure that community involvement in Northland brown kiwi protection is optimised, sustained and follows best practice.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
15.1	Provide assistance to kiwi projects throughout the region with accessing funding and support, via the Northland Kiwi Forum.	Throughout	Essential	Northland Kiwi Forum
15.2	Encourage continued capacity within the NZ Landcare Trust and DOC to support local kiwi projects.	Throughout	Essential	Northland Kiwi Forum
15.3	Continue to encourage community involvement in the implementation of the Northland brown kiwi taxon plan.	Throughout	Essential	Northland Kiwi Forum

The following actions also contribute to meeting the above objectives:
Action 1.4—see Section 5.1.1
Action 1.5—see Section 5.1.1
Action 2.4—see Section 5.1.2
Action 13.3—see Section 5.2.1

5.2.4 Topic 16: Statutory planning

Background

Northland brown kiwi can be found in close proximity to residential areas, in some cases living amongst rural-residential and lifestyle lots. This is largely a consequence of the subdivision of peri-urban and rural lands. Kiwi may also be present within forestry plantations and pasture. Thus kiwi are vulnerable to the activities of people, not just those associated with the immediate clearance and development of land and farm forestry activities, but also ongoing lifestyle factors associated with residential areas.

The sustainable management of Northland brown kiwi populations requires collaboration with planning authorities. These authorities 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 in their planning regulations, where appropriate, and enforce them, where applicable.

There are some examples of land development which provide for habitat enhancement and ongoing pest management for the benefit of kiwi and other indigenous species. Where this has been successful it is largely the result of genuine and committed developers, pet restrictions, a willingness by residents to buy into the ecological merits of the settlement, and support of organisations such as the NZ Kiwi Foundation and NZ Landcare Trust.

Issues

- Predation of kiwi by domestic animals—dogs and cats in particular—is likely to increase with further land development
- Land development has the potential to impact negatively upon kiwi habitat but can also provide opportunities for increased kiwi protection
- The presence of kiwi may be seen as a liability and may potentially limit development in some cases
- Councils need to be aware of the current distribution of kiwi and the issues and solutions for kiwi recovery
- The support and commitment of statutory authorities is critical to minimising the effects of people, their pets, development and land modification on kiwi populations
- 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
- Some landowners with existing and potential kiwi habitat would like incentives to protect, retain and restore that habitat
- 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

Taxon plan objective(s)				
Objective 16.1: To avoid, remedy or mitigate threats to Northland brown kiwi and their habitat by promoting legislative and policy changes by statutory authorities. **Objective 16.2:** To encourage and empower councillors and council staff to advocate for Northland brown kiwi.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
16.1	Encourage local government involvement in the Northland Kiwi Forum.	Throughout	High	Northland Kiwi Forum
16.2	Provide a copy of the Northland brown kiwi taxon plan to all councils and work with staff to apply it, as appropriate.	Throughout	High	DOC/Northland Kiwi Forum
16.3	Develop and deliver kiwi advocacy material for statutory authorities and update as required.	Throughout	High	Northland Kiwi Forum/National Mentor for Advocacy
16.4	Encourage council monitoring of consent conditions when relevant to kiwi.	Throughout	High	DOC/Northland Kiwi Forum/Kiwi projects
16.5	Advocate and provide for consent conditions that protect kiwi habitat, and establish cat- and dog-free zones in subdivisions within high-density kiwi areas.	Throughout	High	DOC/Northland Kiwi Forum/Northland Regional Council/District Councils
16.6	Work closely with councils to establish consistent habitat protection, dog control and enforcement strategies.	Throughout	Essential	DOC/Northland Kiwi Forum/Northland Regional Council/District Councils

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Topic 16 objectives and actions continued from previous page

16.7	Work with councils to develop and implement the Northland brown kiwi habitat corridors identified in Action 8.2—see Section 5.1.8	2014 onwards	Medium	DOC/Northland Kiwi Forum/Northland Regional Council/District Councils
16.8	Work with councils to develop innovative incentives that encourage landowners to retain, enhance and protect areas of existing and potential kiwi habitat.	2013	High	DOC/Northland Kiwi Forum/Northland Regional Council/District Councils

5.2.5 Topic 17: Development of environmental standards—forestry and farming

Background

Northland brown kiwi regularly utilise plantation forests and farmland as habitat. Therefore, they are vulnerable to the operational practices that frequently occur within these areas. Forest and farm managers and owners can make important contributions to the recovery of Northland brown kiwi.

In 2007, the New Zealand Forest Owners Association developed an environmental code of practice for plantation forest management. This code was designed to help forest managers, contractors and staff take into account the many factors that influenced forest management and operations, including kiwi habitat.

In 2008, the BNZSKT, in collaboration with DOC, Whakatane Kiwi Trust and Environment Bay of Plenty, prepared the 'Forestry Management Guidelines for North Island brown kiwi'. Also in 2008, the Bay of Islands Area Office (DOC) prepared kiwi-friendly forestry guidelines for Northland forestry. These practical guides for forestry managers help to ensure that adverse effects on kiwi populations within plantation forestry are minimised.

Issues

- Forestry harvesting techniques are a threat to Northland brown kiwi who often inhabit plantation forests
- Guidelines on kiwi-specific forestry management have been produced but are not yet adequately promoted to the forestry sector
- There are currently no equivalent guidelines for kiwi-friendly farming practices
- The industry will need the support and services of kiwi practitioners to assist with their work

Objectives and actions

Taxon plan objective(s)				
Objective 17.1: To promote and support kiwi-friendly forest management practices. **Objective 17.2:** To promote and support kiwi-friendly farm management practices.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
17.1	Work with the forestry industry to encourage and train managers, owners and contractors about 'kiwi-friendly' forest harvesting methods.	Throughout	Essential	Northland Kiwi Forum/DOC
17.2	Encourage forestry and farming sector involvement in the Northland Kiwi Forum.	Throughout	High	Northland Kiwi Forum

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Topic 17 objectives and actions continued from previous page

17.3	Ensure all foresters have access to the 'kiwi-friendly' forestry documents.	Throughout	High	DOC/Northland Kiwi Forum
17.4	Establish a 'kiwi-friendly' logo and accreditation system for forestry activities.	2013	Medium	Northland Kiwi Forum/BNZSKT
17.5	Work towards developing and applying 'kiwi-friendly' farming guidelines.	2015	Medium	DOC/Northland Kiwi Forum

5.3 Research, monitoring and innovation

The recovery of kiwi has greatly benefited from research and technological developments, and will continue to be dependent on sound scientific understanding and development of adequate tools. Current limitations include affordability and the scale of pest management required, as well as the monitoring and management of sporadic predation events and rogue predators (e.g. dogs and ferrets).

Most recent research for Northland brown kiwi has been undertaken by DOC within the WKS and Trounson Kauri Park. This largely involves experimental management 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 another critical research requirement.

Topics

5.3.1 Topic 18: Genetics and taxonomy

Background

Some recently established and isolated populations of kiwi will have passed through genetic bottlenecks. In the absence of a sound understanding of the effects of reduced genetic diversity, kiwi management needs to apply a precautionary approach by minimising loss of genetic diversity.

Important progress has been made over the last decade in understanding kiwi taxonomy (e.g. Burbridge et al. 2003; Tennyson et al. 2003: Shepherd & Lambert 2008). Northland brown kiwi has been identified as one of four genetically distinct brown kiwi taxa, but further genetic analysis is required to ascertain the level of distinction (Burbridge et al. 2003).

Issues

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

Objectives and actions

Taxon plan objective(s)				
Objective 18.1: To formally clarify the taxonomy of Northland brown kiwi.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
18.1	Support research into the genetic distinctiveness of Northland brown kiwi.	Throughout	High	DOC
18.2	Support research into the loss of genetic diversity of Northland brown kiwi.	Throughout	High	DOC

5.3.2 Topic 19: Predator management

Background

Predators remain the primary agents of decline for kiwi populations in Northland. Where predators are effectively controlled, the decline of kiwi populations is halted and recovery is achieved.

There are currently effective predator control technologies and methodologies available to protect kiwi, but they incur high labour costs. Without the development and application of new and more efficient technologies, pest control is likely to be limited to a few kiwi populations existing in relatively small, intensively managed pockets, while unmanaged populations will continue to decline.

In Northland, dogs are the main predator of kiwi, yet few tools are available to mitigate or reduce this threat. Kiwi aversion training for dogs is one method used, but the next step for kiwi recovery in Northland is active management of the threat that all dogs pose to kiwi populations. Dogs are used in or near kiwi habitat for pig hunting and/or control. Establishing an alternative effective way of controlling pigs would reduce the need for dogs to be present in kiwi habitat.

Kiwi are particularly vulnerable to stoat predation between 10 and 90 days after hatching (McLennan et al. 2004). Considerable effort has been put into developing tools to minimise stoat predation. Trapping is widely used throughout kiwi habitat in Northland, with increased effort into trap refinement and bait preferences. Recent results from the WKS indicate that stoats may become trap shy in continuously trapped areas. Development of secondary methods to control trap-shy individuals and determining the optimal effort to maintain minimal stoat numbers is therefore important. Brodifacoum and 1080 have been used successfully to target rats and possums, with cats and stoats also killed through secondary poisoning. However, at present these toxins must be used for the target animals only and cannot be used specifically for cats or stoats. Some individuals and groups oppose the use of these toxins for predator control.

Issues

- Northland brown kiwi populations will continue to decline and some will become extinct in unmanaged areas.
- Kiwi are long-lived and require secure habitats throughout their life span and for the life span of following generations.
- Juvenile kiwi can disperse a long way from their natal territory. They may, therefore, 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 are the key agent of decline of Northland brown kiwi.
- Tools for dog control are limited or unproven.
- Mainland islands (fenced and unfenced) are subject to reinvasion pressure from threats and require ongoing maintenance.
- Predator fences can be an effective tool for protecting Northland brown kiwi, but are expensive and have ongoing costs. They also inhibit kiwi dispersal.
- Deer or electric fences can exclude dogs while allowing kiwi dispersal.
- Existing technologies for predator control to protect kiwi are labour intensive and not always fully effective.
- Predator trapping can remove the top predators and so lead to a growth in rat populations, to the detriment of plant and animal species vulnerable to rats.
- Stoats may become trap shy in continuously trapped areas.
- Ongoing predator control is expensive.
- Landscape-scale, cost-effective pest control methods are required.

Objectives and actions

Taxon plan objective(s)				
Objective 19.1: To reduce the impact of predators so that Northland brown kiwi recruitment and survival outweighs mortality. **Objective 19.2:** To reduce kiwi deaths by dog predation. **Objective 19.3:** To encourage the use of fences (predator, and deer or electric) for the protection of kiwi habitat where appropriate. **Objective 19.4:** To investigate effective, innovative methods to reduce the impact of dogs on kiwi populations. **Objective 19.5:** To support investigations to develop cost-effective large-scale predator control. **Objective 19.6:** To support the investigation of pig control techniques. **Objective 19.7:** To refine kiwi aversion training for dogs.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
19.1	Continue to use predator control to protect Northland brown kiwi.	Throughout	Essential	DOC/tangata whenua/landcare groups/ landowners
19.2	Advocate for dog control and offer kiwi aversion training for dogs where dogs are present in or near kiwi habitat.	Throughout	Essential	DOC/Northland Kiwi Forum
19.3	Complete the certification of all kiwi aversion trainers to enable training throughout Northland.	2011	Essential	DOC
19.4	Complete the certification of all kiwi aversion trainers to enable training throughout Northland.	Throughout	Essential	DOC/Northland Kiwi Forum
19.5	Support and assist with the research, development and trial of predator control methodologies for key predators, including dogs.	Throughout	Essential	DOC
19.6	Test dog advocacy and dog control within the WKS and, if successful, apply elsewhere.	Throughout	Essential	DOC
19.7	Develop and trial pig control (including trapping) techniques, and, if successful, apply elsewhere.	Throughout	Medium	Northland Kiwi Forum
19.8	Refine kiwi aversion training for dogs and, if successful, apply elsewhere.	2011	Essential	KRG/WKS/ R&D/BNZSKT
19.9	Support the trialling of a dog toxin for uncontrolled dogs in kiwi habitat.	Throughout	Essential	DOC/Northland Kiwi Forum

The following action also contributes to meeting the above objectives:
Action 3.5—see Section 5.1.3

5.3.3 Topic 20: Kiwi monitoring

Background

The direction of recovery effort needs to be supported with robust information about population status and trends in both managed and unmanaged kiwi populations. Several techniques are used in order to monitor kiwi presence, activity and population trends in an area. These are:

- 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 (Robertson & Colbourne 2003), summarised in Appendix 4.

Issues

- Population trend monitoring requires long-term commitment 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, expensive and labour intensive
- Call-count monitoring alone does not provide robust information on population size

Objectives and actions

Taxon plan objective(s)				
Objective 20.1: To ensure that sufficient and robust information is available to assess the status and population trends of Northland brown kiwi. **Objective 20.2:** To contribute sufficient and robust information to ensure the ecology and behaviour of Northland brown kiwi can continue to be assessed.				
Taxon plan actions required to achieve objective(s)				
Action		**Timeframe**	**Priority**	**Delivery**
20.1	Continue with annual call-count monitoring throughout Northland to monitor broad trends in kiwi populations.	Throughout	Essential	DOC/Northland Kiwi Forum
20.2	Endeavour to have at least three local certified kiwi dogs available for project support and surveys.	Throughout	High	DOC/Northland Kiwi Forum
20.3	Facilitate a workshop to train community kiwi practitioners in advanced kiwi monitoring methods.	Biennially from 2012	High	DOC/Northland Kiwi Forum
20.4	Provide support to community projects so they can more accurately estimate population trends through analysis of monitoring data.	Throughout	High	DOC/Northland Kiwi Forum
20.5	Support and assist with research into kiwi monitoring methods.	Throughout	High	DOC
20.6	Support and assist with research into kiwi ecology and behaviour.	Throughout	High	DOC

The following action also contributes to meeting the above objectives:
Action 3.6—see Section 5.1.3

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Appendix 1

Kiwi projects in Northland

The following table (Table A1.1) lists projects involved in the recovery of Northland brown kiwi. Information has been provided by each party involved and was correct at December 2009.

Table A1.1. List of projects involved in the recovery of Northland brown kiwi.

SITE	PARTIES INVOLVED	START YEAR	AREA MANAGED 2009 (ha)	KIWI PAIRS (2009 CONSERVATIVE ESTIMATE)	FORM OF MANAGEMENT (E.G. TRAPPING, BNZONE, CRÈCHE, KŌHANGA KIWI ETC.)	ADDITIONAL MANAGEMENT PROPOSED OVER NEXT 5 YEARS
EASTERN						
Whangarei Heads	Whangarei Heads Landcare Forum/DOC	1999	6000	100+	Trapping, BNZONE, pig removal. No kiwi aversion for dogs training, monitoring of adult kiwi.	As before, plus increased community engagement advocacy, strategic use of dog toxin when available, increase dog advocacy, decrease kiwi monitoring at Bream Head.
WKS (excl. Bream Head)	DOC/private	1990	4800	500+	Predator trapping, BNZONE, advocacy.	Increase dog advocacy, decrease kiwi monitoring
Pipiwai	Hancock Forest Management/DOC	2003	400	Unknown, low		Project stopped 2009.
Ngunguru, Tutukaka	DOC/Tutukaka Landcare Coalition	2000	2500	80	Predator trapping, advocacy.	Possible BNZONE.
Taupiri and Elliots Bay	NZ Kiwi Foundation	2004	120	4+ but unconfirmed		
SOUTH CENTRAL						
Kiwi sanctuary — Motatau/ Marlow	DOC/ Ngati hine	1994	2000+	Unknown, moderate	Predator trapping, advocacy.	Increase dog advocacy, decrease kiwi monitoring.
Stoney Creek/ Worsp Rd	DOC/D and J Mackay	2007	4000	10	Predator trapping, advocacy.	
KAURI COAST						
Trounson Kauri Park	DOC	1995	445 forest; 1000 surrounds	66	DOC Mainland Island: mustelid, cat trapping; rodent and possum poison control. Currently trialling DOC250 traps v. double set Fenn traps.	Plan to compare single v. double entrance tunnels for DOC250 traps.
Waipoua	Waipoua Forest Trust/Te Iwi o Te Roroa	2004	1100	50	Predator trapping.	Kōhanga kiwi Including BNZONE.
Waipoua Forest	DOC		12000	266	Periodic aerial 1080 operations (approx. every 5 years); some mustelid trapping 2002–2005.	Seek funding to undertake mustelid control in core areas

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Table A1.1 continued from previous page

SITE	PARTIES INVOLVED	START YEAR	AREA MANAGED 2009 (ha)	KIWI PAIRS (2009 CONSERVATIVE ESTIMATE)	FORM OF MANAGEMENT (E.G. TRAPPING, BNZONE, CRÈCHE, KŌHANGA KIWI ETC.)	ADDITIONAL MANAGEMENT PROPOSED OVER NEXT 5 YEARS
Waipoua: Coach Rd, Mataraua Forest	DOC	1995	600	80+	Possum and rodent gridline protection; 100 single set Fenn traps in 600-ha area.	Using best practise mustelid control for kiwi protection; Neighbouring landowner using 20 double set Fenn traps.
Waipoua Forest	Iwi O Te Roroa	-	-			Aim to work with DOC and Waipoua Forest Trust in future management and kiwi protection work.
Wekaweka	Wekaweka Landcare	2004	200	Unknown, moderate	Possum control for 6 months over summer; mustelid traps doing monthly checks throughout year; rat control poisoning once a year.	
Opouteke	Hancock Forest Management	2005	300 and 9000 pine forest	40+	Trapping.	Continued trapping, kiwi listening and kiwi health survey.
Waima	Te Mahurehure Roopu Whenua Taonga Trust/DOC	2005		Unknown, moderate	Trapping for kokako and kiwi.	
BAY OF ISLANDS						
Hupara	Hupara Landcare	2005		Unknown, high		
Russell Peninsula	NZ Kiwi Foundation/ Russell Kiwi Landcare	2000	2000	100+		
Bay of Islands	DOC/island landowners					
Waitangi	DOC	2001	1000	Unknown, high		
Waikino	Waikino Group	2005	800	Unconfirmed, low		
Kerikeri Peninsula	NZ Kiwi Foundation	1990	2500	80+		
Wharau Rd (Sth side of KK Inlet)	NZ Kiwi Foundation	2002	500	10+		
Purerua Peninsula	NZ Kiwi Foundation	2001	3000	200+		

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Table A1.1 continued from previous page

SITE	PARTIES INVOLVED	START YEAR	AREA MANAGED 2009 (ha)	KIWI PAIRS (2009 CONSERVATIVE ESTIMATE)	FORM OF MANAGEMENT (E.G. TRAPPING, BNZONE, CRÈCHE, KŌHANGA KIWI ETC.)	ADDITIONAL MANAGEMENT PROPOSED OVER NEXT 5 YEARS
Waimate North	Waimate North Landcare Trust	2004	9000	500 Unconfirmed	Trapping.	Increase trapping.
Te Tii/ Tapuaetahi	NZ Kiwi Foundation	2004	300	Low		
Aroha island	Aroha Island Charitable Trust	2008		2	Trapping. Education and advocacy.	Continue trapping, become a major education facility.
Kauri Cliffs	Julian Robertson/ NZ Kiwi Foundation	2001	2500	10 unconfirmed		
Takou Bay	Takou Were to Mokai/NZ Kiwi Foundation	2004	2000	10 unconfirmed	Trapping, possum control.	
Puketi	Puketi Forest Trust	2004	5500	60	Trapping.	Replace Fenn traps with DOC200 traps, decrease spacing from 200 m to 100 m.
Taupo Bay	Taupo Bay community group	2005	600	Unconfirmed low	Trapping.	
Mahinepua	Mahinepua Radar Hill Landcare Group	2002	1835	20	Trapping/predator control.	
KAITAIA						
Whakaangi	Whakaangi Landcare Trust	2004	2900	200	Trapping, baiting, integrated pest and predator control (possums, pigs, cats, rats, mustelids, hedgehogs).	Kōhanga kiwi, supporting other Far North kiwi projects, advocacy, kiwi aversion for dogs training programme.
Wells Road	Higginson/Khaine	1990	40	Low	Intensive trapping and baiting.	
Herekino	Renwick/Sporle	1990	50	Low		
East Kaitaia	Baigent	2009	55	High	Setting up intensive management.	Maintain intensive management.
Takahue	Schou	1995	124	Med	Possum control, cat and mustelid trapping.	
Humphries Road	Blunden	2007			Trapping, possum baiting.	
Honeymoon Valley	Local residents	2005	500	Unconfirmed low	Trapping.	
Puhoi block	Forest Restoration Trust			Unconfirmed, low		

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Table A1.1 continued from previous page

SITE	PARTIES INVOLVED	START YEAR	AREA MANAGED 2009 (ha)	KIWI PAIRS (2009 CONSERVATIVE ESTIMATE)	FORM OF MANAGEMENT (E.G. TRAPPING, BNZONE, CRÈCHE, KŌHANGA KIWI ETC.)	ADDITIONAL MANAGEMENT PROPOSED OVER NEXT 5 YEARS
Kohumaru Landcare		2008	272	3	Trapping with DOC200, Timm and leghold traps; kiwi call monitoring.	Link all properties together. Continue trapping and monitoring.
East Herekino	NZ Kiwi Foundation	2005	2000+	Unconfirmed	Predator trapping.	
Herekino West	Herekino Landcare Group	2004	1000	Low, unconfirmed		
Far North covenants	QEII, NZ Kiwi Foundation, several landholdings	2006	2500	Low-medium	Trapping and possum control.	
SOUTHERN						
Rodney (Tawharanui Regional Park)	TOSSI and ARC*	2006	550	20 (44 individuals released)	Predator-proof fence.	Dog survey 2012. Kōhanga kiwi.
Rodney (Shakespear Regional Park)	SOSSI and ARC*	2012	550	nil	Predator-proof fence 2009/10; establish kiwi approx. 2012.	Predator-proof fence 2009/10; establish kiwi approx. 2012.
ISLANDS						
Matakohe	FOMLI, DOC	2001	39 plus the buffer zone	2 adult pairs plus up to 25 chicks/ juveniles	BNZONE, crèche, trapping on island and buffer. Intensive poison control for rodents.	
Motukawanui	DOC	1990	380	Unknown, high		
Motuora	Motuora Restoration Society					
Kawau Island						
Ponui Island				High		

* TOSSI = Tawharanui Open Sanctuary Society Inc; ARC = Auckland Regional Coucil which has been superceded by the new Auckland Council; SOSSI = Shakespear Open Sanctuary Society.

Appendix 2

Northland brown kiwi key stakeholders

Department of Conservation (DOC)

DOC is the lead agency in kiwi recovery. However, not all DOC Area Offices have adequate funding and resources for active management. The main DOC-led Northland brown kiwi projects are the WKS and Trounson Kauri Park. DOC has facilitated the development of this plan, and is involved in its implementation. Increasingly, DOC's role is to provide technical support for the numerous Northland brown kiwi protection projects 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 in the Northland Conservancy which includes the Whangarei Area Office, Kauri Coast Area Office, Bay of Islands Area Office and Kaitaia Area Office; and the Auckland Conservancy which includes the Warkworth Area Office and the Auckland Area Office.

Tangata whenua

Northland brown kiwi are found throughout the rohe of many iwi, 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: Ngāti Kuri, Ngāi Takoto, Te Aupōuri, Te Rarawa, Ngāti Kahu, Ngāti Kahu ki Whangaroa, Ngapuhi, Te Roroa, Te Uri o Hau, Te Iwi o Ngāti Wai, Ngāti Hine, Te Parawhau, Te Iwi o Te Roroa, Whiranaki Maori community (Te Hikitū), Pakanae Hapū Resource Community, Hita Whanau Trust, Te Rūnanga o Ngā Puhi, Ngāti Manuhiri, Ngāti Rehua, Ngāti Poa, Ngāi Tai ki Tamaki, Te Kawarau a Maki, Hauraki Maori Trustboard, Ngāti Whatua, Ngāti Paoa, Kawerau a Maki.

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

- Takou Were Te Mokai Landcare are working to enhance kiwi populations in the Takou Bay area with support from NZ Kiwi Foundation. Takou Were Te Mokai Landcare are committed to making their area free of predators and see education and kiwi protection as paramount.
- Ngāti Hine actively support WKS work within their rohe.
- During the development of this plan, Te Uri o Hau representatives stated that they wanted to begin active kiwi management in their rohe by identifying two areas in which 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, Queen Elizabeth II National Trust, Forest Restoration Trust. Total Kiwi Services, RITO: Conservation advocacy, education and design.

Community groups

The larger projects include Whangarei Heads Landcare Forum, Whakaangi Landcare Trust, Mahinepua/Radar Hill, Waimate North Landcare Trust, 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, Kawau Island Kiwi Project and TOSSI.

Captive and BNZ Operation Nest Egg™ facilities

Auckland Zoo, the Whangarei Native Bird Recovery Centre and the Whangarei Museum and Kiwi House.

Sponsors

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

Regional and Local authorities

Northland Regional Council, the new Auckland Council, Far North District Council, Whangarei District Council and Kaipara 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 northern Northland, Wendy Sporle and Lesley Baigent have facilities for kiwi treatment and rehabilitation. In central Northland, the Kamo Vet Clinic can provide treatment. The Whangarei Native Bird Recovery Centre provides treatment and rehabilitation. Closer to Auckland, kiwi are taken to local vets for stabilisation and are then transferred to Auckland Zoo. Kiwi with any major injuries and illness are to be transferred to Massey University Wildlife Health Centre at Palmerston North.

Individual landowners

Throughout the region, individual landowners are carrying out pest and predator control on their properties in order to encourage the recovery of kiwi populations. Some properties are self managed and others use contract trappers. Many of these managed areas are legally protected through the 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.

Kiwi Recovery Group

The Kiwi Recovery Group (KRG) consists of people with expert knowledge of the ecology and management needs of kiwi, and their role is to provide high-quality technical advice that achieves the security and recovery of kiwi. The KRG maintain and oversee the implementation of the Kiwi Recovery Plan.

Appendix 3

Timeline and priorities for recovery actions for Northland brown kiwi

The shaded areas on the table (Table A3.1) are years when actions should be implemented.

Priorities:

E = Essential—to be done within specified time frame and/or at the frequency required to achieve the goals for kiwi recovery over the term of this plan. Highest risk for kiwi recovery if not done within the specified time frame 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 time frame 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 time frame and/or frequency.

Table A3.1. Timeline and priorities for recovery actions for Northland brown kiwi.

ACTION		PRIORITY	DELIVERY	2011	2012	2013	2014	2015	2016	2017	2018	2019
1.1	Northland brown kiwi taxon plan completed to Conservator approval.	E	DOC									
1.2	Undertake full review of recovery progress and application of taxon plan at half way point of current plan (2011–2019).	E	DOC/Northland Kiwi Forum									
1.3	Northland Kiwi Forum formed to participate in the facilitation, implementation, review and maintenance of the Northland brown kiwi taxon plan.	E	Northland Kiwi Forum									
1.4	Northland Kiwi Forum representatives will meet biannually, in March and September.	E	Northland Kiwi Forum									
1.5	The Northland Kiwi Forum will ensure relevant information regarding kiwi management is available to all stakeholders.	H	Northland Kiwi Forum									
1.6	Establish and secure resourcing for an administrator role within the Northland Kiwi Forum.	M	Northland Kiwi Forum/BNZSKT									
2.1	Ensure best practice is promoted and monitored throughout the term of the plan.	E	DOC/Northland Kiwi Forum									
2.2	Communicate developments in best practice, management and science to stakeholders.	E	DOC/Northland Kiwi Forum									
2.3	Provide regular pest control workshops to those implementing field programmes.	H	DOC/NZ Landcare Trust/Northland Kiwi Forum									
2.4	Provide a regular Northland brown kiwi taxon hui.	H	DOC/Northland Kiwi Forum									
2.5	Distribute national monitoring and data collection templates.	H	DOC/Northland Kiwi Forum									

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Table A3.1 continued from previous page

ACTION		PRIORITY	DELIVERY	2011	2012	2013	2014	2015	2016	2017	2018	2019
3.1	Assess the potential for establishment of ecological corridors between WKS areas and develop a strategy for establishing these.	M	DOC									
3.2	Continue to improve and refine stoat and other predator control methods in the WKS.	E	DOC									
3.3	Maintain relationships and support tangata whenua, landcare groups and surrounding landowners associated with the WKS.	E	WKS staff/tangata whenua/landcare groups/landowners									
3.4	Communicate with other sanctuary staff throughout the country with regular debriefs/networking events.	M	DOC									
3.5	Implement a marketing campaign to increase awareness of the impact of dogs on kiwi, with the aim of reducing this impact.	E	WKS									
3.6	Contribute to the development of a national database for kiwi projects.	H	WKS									
4.1	Develop an island strategy for Northland brown kiwi that is consistent with the proposed National Island Strategy for kiwi.	E	KRG/DOC/ Northland Kiwi Forum									
4.2	Ascertain population estimates for all islands containing Northland brown kiwi.	M	DOC/Northland Kiwi Forum									
4.3	Provide technical support and networking for landowner/occupiers with island kiwi populations.	M	DOC/Northland Kiwi Forum									
4.4	Use advocacy to minimise the risk of predation to all offshore island kiwi populations.	H	Northland Kiwi Forum									
4.5	Advocate for dog control and offer kiwi aversion training for dogs where dogs are present on islands.	E	Northland Kiwi Forum									
5.1	Develop, maintain and implement island biosecurity plans (including contingency plans) and protocols for islands with Northland brown kiwi.	E	DOC/Northland Kiwi Forum									
6.1	Identify 500 pairs (e.g. 125 pairs across four sites) to be protected under sustained management as a minimum secure population in the advent of a sudden population decline.	E	DOC									
6.2	Protect a minimum of 1600 breeding pairs of kiwi across a minimum of four managed sites by 2019, and work towards expanding those areas with habitat corridors.	E	DOC/Northland Kiwi Forum									
6.3	Identify and protect at least six sites where between 50 and 200 breeding pairs are currently present, and double those populations by 2019.	E	DOC/Northland Kiwi Forum									

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Table A3.1 continued from previous page

ACTION		PRIORITY	DELIVERY	2011	2012	2013	2014	2015	2016	2017	2018	2019
6.4	Identify and secure a minimum of 15 additional sites under effective management and work towards expanding those areas with habitat corridors.	E	DOC/Northland Kiwi Forum									
6.5	Work closely with tangata whenua and community-based projects to aid population recovery.	E	DOC/Northland Kiwi Forum									
7.1	Apply landscape-scale integrated predator control, targeting mustelids and cats, at the sites with greatest potential gain.	E	DOC/Northland Kiwi Forum/kiwi projects									
7.2	Establish a regime for managing small and/or isolated populations.	H	KRG/DOC/Northland Kiwi Forum									
8.1	Identify and establish a minimum of two reintroduction sites within the former extent of the Northland brown kiwi range.	M	DOC/Northland Kiwi Forum/KRG									
8.2	Maximise opportunities to establish corridors between managed sites of Northland brown kiwi habitat (refer to Pierce et al. 2006).	H	DOC/Northland Kiwi Forum									
8.3	Support and/or undertake further surveys to conclusively identify the extent of Northland brown kiwi distribution.	M	DOC/Northland Kiwi Forum									
8.4	Manage Northland brown kiwi to maintain fine-scale diversity by minimising translocations between geographic extremes and natural boundaries.	E	DOC									
9.1	Prepare a management plan for the Ponui Island mixed-provenance birds, addressing both short- and long-term implications for this population. This should be considered	H	KRG									
9.2	Consider the management plan for Ponui Island kiwi in the Northland brown kiwi taxon plan review.	E	DOC/Northland Kiwi Forum/ Massey University/ landowners									
10.1	Actively involve representatives from captive facilities holding Northland brown kiwi in kiwi recovery and in the Northland Kiwi Forum.	E	Northland Kiwi Forum									
10.2	Encourage captive institutions to deliver accurate and consistent advocacy messages.	H	Northland Kiwi Forum									
10.3	Include implementation of best practice as described in the kiwi captive husbandry manual as part of the permit conditions for captive facilities.	E	Northland Conservator/Captive Institutions									
11.1	Ensure that BNZONE minimum standards are followed by all Northland brown kiwi BNZONE projects.	E	DOC/Northland Kiwi Forum									
11.2	Apply Kiwi Recovery Group guidelines for when and where to use BNZONE.	H	Northland Kiwi Forum									

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Table A3.1 continued from previous page

ACTION		PRIORITY	DELIVERY	2011	2012	2013	2014	2015	2016	2017	2018	2019
11.3	Provide recommendations to the Kiwi Recovery Group on the development of a 10-year plan for BNZONE, including the number and location of incubation facilities, crèche sites and kōhanga kiwi for Northland brown kiwi.	H	DOC/Northland Kiwi Forum									
11.4	Support the use of BNZONE advocacy opportunities as part of a project's management tools, but not kiwi handling for advocacy purposes alone.	M	DOC/Northland Kiwi Forum									
12.1	Maintain the current kōhanga kiwi site in Northland, and establish more if needed.	E	DOC									
12.2	Maintain at least one kiwi crèche site for the WKS, and develop further kiwi crèche sites as required.	E	DOC									
13.1	Encourage people to become actively involved in Northland brown kiwi protection through advocacy programmes, e.g. workshops, training, support.	E	Northland Kiwi Forum									
13.2	Produce a regular newsletter to be distributed to all Northland brown kiwi projects and interested stakeholders.	H	Northland Kiwi Forum									
13.3	Develop a Northland brown kiwi section within the BNZSKT website.	M	Northland Kiwi Forum									
13.4	Support all appropriate dog control advocacy programmes.	E	DOC/Northland Kiwi Forum									
13.5	Ensure that kiwi aversion training for dogs workshops optimise the advocacy opportunity.	E	DOC/Northland Kiwi Forum									
13.6	Support research into the potential benefits of eco-tourism for Northland brown kiwi.	M	Northland Kiwi Forum									
14.1	Support tangata whenua-led kiwi protection initiatives.	E	DOC/Northland Kiwi Forum									
14.2	Increase tangata whenua involvement in kiwi recovery.	E	DOC/Northland Kiwi Forum									
14.3	Ensure tangata whenua are involved in the Northland brown kiwi hui.	H	DOC/Northland Kiwi Forum									
14.4	Offer marae-based advocacy and kiwi aversion training for dogs.	E	DOC/Northland Kiwi Forum									
14.5	Continue to provide cultural materials (kiwi feathers) to groups/individuals as approved by the Pataka Komiti.	E	DOC									
15.1	Provide assistance to kiwi projects throughout the region with accessing funding and support, via the Northland Kiwi Forum.	E	Northland Kiwi Forum									
15.2	Encourage continued capacity within the NZ Landcare Trust and DOC to support local kiwi projects.	E	Northland Kiwi Forum									

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Table A3.1 continued from previous page

ACTION		PRIORITY	DELIVERY	2011	2012	2013	2014	2015	2016	2017	2018	2019
15.3	Continue to encourage community involvement in the implementation of the Northland brown kiwi taxon plan.	E	Northland Kiwi Forum									
16.1	Encourage local government involvement in the Northland Kiwi Forum.	H	Northland Kiwi Forum									
16.2	Provide a copy of the Northland brown kiwi taxon plan to all councils and work with staff to apply it, as appropriate.	H	DOC/Northland Kiwi Forum									
16.3	Develop and deliver kiwi advocacy material for statutory authorities and update as required.	H	Northland Kiwi Forum/National Mentor for Advocacy									
16.4	Encourage council monitoring of consent conditions when relevant to kiwi.	M	DOC/Northland Kiwi Forum/Kiwi projects									
16.5	Advocate and provide for consent conditions that protect kiwi habitat, and establish cat- and dog-free zones in subdivisions within high-density kiwi areas.	H	DOC/Northland Kiwi Forum/ Northland Regional Council/ District Councils									
16.6	Work closely with councils to establish consistent habitat protection, dog control and enforcement strategies.	E	DOC/Northland Kiwi Forum/ Northland Regional Council/District Councils									
16.7	Work with councils to develop and implement the kiwi corridors identified in action 8.2, section 5.1.8.	M	DOC/Northland Kiwi Forum/ Northland Regional Council/District Councils									
16.8	Work with councils to develop innovative incentives that encourage landowners to retain, restore and protect areas of existing and potential kiwi habitat.	H	DOC/Northland Kiwi Forum/ Northland Regional Council/District Councils									
17.1	Work with the forestry industry to encourage and train managers, owners and contractors about 'kiwi-friendly' forest harvesting methods.	E	Northland Kiwi Forum/DOC									
17.2	Encourage forestry and farming sector involvement in the Northland Kiwi Forum.	H	Northland Kiwi Forum									
17.3	Ensure all foresters have access to the 'kiwi-friendly' forestry documents.	M	DOC/Northland Kiwi Forum									
17.4	Establish a 'kiwi-friendly' logo and accreditation system for forestry activities	M	Northland Kiwi Forum/BNZSKT									
17.5	Work towards developing and applying 'kiwi-friendly' farming guidelines.	M	DOC/Northland Kiwi Forum									
18.1	Support research into the genetic distinctiveness of Northland brown kiwi.	H	DOC									
18.2	Support research into the loss of genetic diversity of Northland brown kiwi.	H	DOC									

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Table A3.1 continued from previous page

ACTION		PRIORITY	DELIVERY	2011	2012	2013	2014	2015	2016	2017	2018	2019
19.1	Continue to use predator control to protect Northland brown kiwi.	E	DOC/tangata whenua/landcare groups/landowners									
19.2	Advocate for dog control and offer kiwi aversion training for dogs where dogs are present in or near kiwi habitat.	E	DOC/Northland Kiwi Forum									
19.3	Complete the certification of all kiwi aversion trainers to enable training throughout Northland.	E	DOC									
19.4	Advocate for the use of fences to protect Northland brown kiwi from predators.	E	DOC/Northland Kiwi Forum									
19.5	Support and assist with the research, development and trial of predator control methodologies for key predators, including dogs.	E	DOC									
19.6	Test dog advocacy and dog control within the WKS and, if successful, apply elsewhere.	E	DOC									
19.7	Develop and trial pig control (including trapping) techniques and, if successful, apply elsewhere.	M	Northland Kiwi Forum									
19.8	Refine kiwi aversion training for dogs and, if successful, apply elsewhere.	E	KRG/WKS/R&D/ BNZSKT									
19.9	Support the trialling of a dog toxin for uncontrolled dogs in kiwi habitat.	E	DOC/Northland Kiwi Forum									
20.1	Continue with annual call-count monitoring throughout Northland to monitor broad trends in kiwi populations.	E	DOC/Northland Kiwi Forum									
20.2	Endeavour to have at least three local certified kiwi dogs available for project support and surveys.	H	DOC/Northland Kiwi Forum									
20.3	Facilitate a workshop to train community kiwi practitioners in advanced kiwi monitoring methods.	H	DOC/Northland Kiwi Forum									
20.4	Provide support to community projects so they can more accurately estimate population trends through analysis of monitoring data.	H	DOC/Northland Kiwi Forum									
20.5	Support and assist with research into kiwi monitoring methods.	H	DOC									
20.6	Support and assist with research into kiwi ecology and behaviour.	H	DOC									

Appendix 4

Summary of kiwi monitoring methods

Call-count monitoring

Call-count monitoring was originally established in the mid 1990s and is the usual technique used to measure trends in Northland kiwi abundance (Robertson & Colbourne 2003). It involves listening for and recording kiwi calls during the dark phase of the moon in late May to June. Male and female kiwi produce very different-sounding calls so it is possible to identify the presence of pairs in an area, as most territorial kiwi call regularly and very loudly, and it is possible to identify the direction and relative distance of the call up to 1.5 km away (Robertson & Colbourne 2003). Most sites in Northland are monitored annually and data is collated into an annual Northland kiwi call-count monitoring report. Some more remote populations receive 5-yearly monitoring. This method is useful for determining presence or absence and recording trends, but it does not measure abundance and it is prone to observer bias.

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 is most accurate when information is collected by radio-telemetry tracking of kiwi that have transmitters attached to them.

Footprint size

Measuring the length of all kiwi footprints seen during the winter months can provide an indication of 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 period of greatest stoat abundance in summer. Footprints over 90 mm in length are likely to be those of adults (Pierce et al. 2006).

Dog surveys to determine age structure of the population

Specially trained kiwi dogs and handlers can be used to find kiwi so that their age can be determined. These data can then be analysed to determine the survival of kiwi chicks and juveniles. The proportion of juveniles reflects the health of the population. A high proportion (30+%) of juvenile kiwi in a population indicates that predator control is protecting chicks effectively (Robertson & Fraser 2009). A sample of 20–30 kiwi is recommended, so this method is most effective in high-density populations. The surveys can be repeated at 3- to 5-year intervals (Pierce et al. 2006).

Telemetry

Radio-telemetry is considered the best tool for locating kiwi so their survival and movement can be monitored, and it is used as the primary tool to find nests and follow their fate. Most kiwi radio-tracking in Northland is ground-based; however, some kiwi, especially juveniles and sub-adults, can wander long distances (20+ km), and the only effective way to find them is to use aircraft to detect the signals from the transmitters attached to them.

Population modelling

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.