



Taxon Plan for Western Brown Kiwi (*Apteryx mantelli*)

Strategic Plan for the recovery of western brown kiwi for the period 2011 – 2021 and beyond, including key actions required for their recovery

Author: Jessica Scrimgeour and Alison J Pickett



© Copyright September 2011, New Zealand Department of Conservation

ISBN 978-0-478-14923-4

Published by
Department of Conservation
Tongariro Whanganui Taranaki Conservancy
Private Bag 3016
Whanganui
New Zealand

In the interest of forest conservation, we support paperless electronic publishing.

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 taxa¹. The Kiwi Recovery Group is responsible for the implementation and review of this national plan.

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

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 work plan. Nor do taxon plans provide details of best practice information which is instead provided at a national level by the Kiwi Best Practice Manual (Robertson *et al.* 2003).

The accountability for each taxon plan rests with a lead conservancy, in consultation and guidance with the Kiwi Recovery Group. In some cases the implementation and review of taxon plans will be supported by a 'taxon group', including key stakeholders and participants in the recovery of that taxon.

Taxon plans have been developed in collaboration with key stakeholders for the taxon, including iwi, landowners, community-led kiwi projects and other conservancies involved in its recovery. 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.

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

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; North Island 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 provenances of kiwi currently recognised but not formally described, within each of the species NI brown (Northland, Coromandel, eastern and western) and tokoeka (Haast, Northern and Southern Fiordland and Stewart Island).

Taxon - Singular, referring to single taxa.

CONTENTS

Summary	4
1 Introduction	5
1.1 Western brown kiwi	5
1.2 Scope of the taxon plan	5
2 Plan term	6
3 Context	6
3.1 Taxonomy	6
3.2 Biology and ecology	7
3.3 Past and present distribution and population trends	7
3.4 Threat status	9
3.5 Agents of decline and current threats	9
3.6 Past and current management	10
3.6.1 Maungatautari Predator Proof Enclosure	10
3.6.2 Tongariro Forest Kiwi Sanctuary	10
3.6.3 Karioi Rahui and Waimarino Forest	10
3.6.4 Kia Wharite Biodiversity Project	12
3.6.5 Taranaki	12
3.6.6 Mixed provenance populations	12
3.6.7 Incubation and crèche facilities	13
3.6.8 Captive breeding	13
3.7 Cultural importance	13
3.8 Public awareness	14
3.9 Recovery principles and preferred option for recovery	14
4 Goals	15
4.1 Long term recovery goal	15
4.2 Goals for the term of this taxon plan	15
5 Implementation	16
5.1 Management	17
5.1.1 Implementation of taxon plan	17
5.1.2 Minimum secure populations	18
5.1.3 Unmanaged populations	19
5.1.4 Tongariro Forest Kiwi Sanctuary	20
5.1.5 Kohanga kiwi	21
5.1.6 BNZ Operation Nest Egg (ONE) and kiwi crèches	22
5.1.7 Captive management	23
5.1.8 Genetic diversity	24
5.1.9 Mixed provenance populations	25
5.1.10 Information sharing	26

5.2	Community	27
5.2.1	Advocacy	27
5.2.2	Tangata whenua	28
5.2.3	Community-led initiatives	29
5.2.4	Statutory planning	30
5.2.5	Development of environmental standards	31
5.3	Research	32
5.3.1	Genetics and taxonomy	32
5.3.2	Autecology and population dynamics	33
5.3.3	Predator management	34
5.3.4	Monitoring	35
6	Acknowledgements	36
7	References	36
8	Appendices	38
	Appendix 1: Actions for recovery	38
	Appendix 2: Western brown kiwi advocacy plan	44

Summary

Western brown kiwi are one of four taxa of brown kiwi, which as a species occurred naturally throughout the North Island, north of the Ruahine Range in the prehistoric past. Like the other eleven recognized kiwi taxa, western brown kiwi have declined in number, predominantly due to introduced predators such as mustelids, dogs and cats. There are an estimated 8,000 western brown kiwi left in the wild (Holzapfel *et al.* 2008), which are continuing to decline in unmanaged populations. The purpose of this document is to outline existing programmes and the priorities to focus on in order to secure and recover western brown kiwi. For the purposes of this plan, this includes the eastern/western mixed provenance populations. The plan sets out priority sites, performance targets and tactical actions for delivering the plan's objectives.

The overall aim of this document is to restore western brown kiwi as a functioning part of natural and managed ecosystems throughout their natural range. It covers 19 topics with 85 actions, with the primary objective of having 2500 pairs of kiwi protected from predators, predominantly stoats. This is already close to being achieved with an estimated 2000 pairs currently under management, either by application of aerial 1080 or large scale trapping.

The priority actions are to maintain predator control at currently managed kiwi populations, and to seek and support new initiatives for predator control to achieve the 2500 pair target by 2020. Increasing the number of pairs present at predator controlled sites through Bank of New Zealand Operation Nest Egg (ONE) and releases from kohanga kiwi sites will hasten the achievement of the stated goal. One of the key features of the plan is forming a western brown kiwi steering group that will be responsible for strategic direction for recovery of western brown kiwi.

It is recognized that community involvement and engagement is an essential component for kiwi conservation. Supporting existing community efforts is vital in reaching the 2500 pair target, and opportunities for new community initiatives need to be encouraged. Tangata whenua are identified as important partners in the management of kiwi and their involvement, while strong in some areas, could be increased. Other gains can be made through advocacy for improved environmental standards on private land.

The main research effort for western brown kiwi is currently at Tongariro Forest Kiwi Sanctuary. The research determining the benefits of aerial 1080 on kiwi chick survival has national importance, and is essential to complete. Other research on sub-adult survival, dispersal, territoriality and age-to-first-breeding is due to be completed in 2012. Further clarification is required of the taxonomic status of the Hauturu kiwi and kiwi found at distribution boundaries between eastern and western brown kiwi.

Maintaining genetic diversity is an important consideration. The mixed provenance populations based at Hauturu/Little Barrier Island, Pukaha Mount Bruce and Rimutakas are covered within this plan.

1 Introduction

1.1 Western brown kiwi

There are currently five kiwi species recognized and eleven kiwi taxa, which includes brown kiwi *Apteryx mantelli*. Brown kiwi are comprised of four taxa – Northland, Coromandel, western and eastern brown kiwi – whose taxonomic status has yet to be formally determined (Holzapfel *et al.* 2008). Brown kiwi occurred naturally throughout the central and northern North Island in the prehistoric past (Gill *et al.* 2010), where it evolved into the four taxa listed above.

The brown kiwi species as a whole is classified as nationally vulnerable (Miskelly *et al.* 2008). Brown kiwi are in the recovery phase of species conservation because they are secure from extinction over the short-term, and the key threats to kiwi and management required to protect them are known. The Kiwi Recovery Group’s objective of securing a minimum 500 pairs of western brown kiwi (Holzapfel *et al.* 2008) has already been achieved. However, western brown kiwi continue to decline throughout their range where they are unmanaged, predominantly due to predation by introduced mammals. They are now absent or reduced to low numbers over large areas of their former distribution. Coordinated recovery is still essential.

The purpose of this document is to outline existing programmes and the priorities to focus on in order to secure and recover western brown kiwi. The plan sets out priority sites, performance targets and tactical actions for delivering the plans objectives, and also co-ordinates the work being undertaken by community groups, the Department of Conservation and other agencies. It does not prevent kiwi protection being initiated in new areas in the future by community groups or other agencies.

1.2 Scope of the taxon plan

This is the first western brown kiwi taxon management plan. It outlines the actions to be undertaken to achieve recovery of this kiwi taxon, based on recovery goals and objectives developed with stakeholders or taken from the national Kiwi Recovery Plan (Holzapfel *et al.* 2008).

This taxon plan supersedes a draft regional western brown kiwi management plan compiled by Whanganui Conservancy in 2007 (DOC 2007a). Material and consultation feedback from that draft have been incorporated into the current plan. The plan also draws on recommendations and analyses from John McLennan’s (2006) technical report “Western North Island brown kiwi (*Apteryx mantelli*): pathways to conservation and recovery”, and an interconservancy agreement between Waikato, Tongariro-Taupo and Whanganui Conservancies regarding regional management of western brown kiwi (DOC 2007b).

The natural range of western brown kiwi includes Tongariro Whanganui Taranaki and Waikato Conservancies. Two mixed provenance western/eastern brown kiwi populations established at Pukaha Mount Bruce and in the Rimutaka Ranges will be integrated with both western and eastern brown kiwi taxon plans. These areas have been designated mixed provenance zones and are part of the national recovery framework for kiwi. A mixed provenance western/Northland brown kiwi population developed through mixed translocations to Pounui Island, Auckland, will be managed under the Northland brown kiwi taxon plan.

2 Plan term

Term of the plan: 10 years, from 2011 to 2021.

3 Context

3.1 Taxonomy

Western brown kiwi were formerly considered part of a single brown kiwi species thought to occur in both the North and South Islands. The former South Island brown kiwi are now recognised as two separate species, the rowi *Apteryx rowi* near Okarito, and tokoeka *A. australis* near Haast, in Fiordland and on Stewart Island (Burbidge *et al.* 2003, Tennyson *et al.* 2003; Gill *et al.* 2010). The North Island brown kiwi can now be referred to simply as brown kiwi.

Brown kiwi originated in the South Island, and diverged after entering the North Island some 500 000 years ago when the two land masses were connected during glaciation in the late Pleistocene (Baker *et al.* 1995). Western brown kiwi are the ancestral stock of all North Island brown kiwi. The birds initially established in the Whanganui/Taranaki region, then fanned out eastwards and northwards. Mixing of populations across the central North Island was then restricted by recurrent volcanic activity and so they appear to have been effectively isolated from each other for at least 200,000 - 300,000 years.

Genetic differences between western brown kiwi in Tongariro, Whanganui, Taranaki and the King Country regions are thought to be insignificant. The genetic status of some populations however, is different or unclear. These are:

- Kaimanawa Ranges - unknown whether kiwi are western or eastern brown kiwi, or a mixed provenance zone. This population is near extinction, and was noted for its high incidence of albinism (Buller 1877).
- Rangitikei - unknown whether small remnant populations are western or eastern brown kiwi. Small numbers of eastern brown kiwi occur nearby in the northern Ruahine Ranges, and western brown kiwi toward Whanganui.
- King Country - very few remaining, possibly some mixing between taxa through translocation of c.50 Northland kiwi rescued from land clearance and released near the headwaters of the Waipa River during the mid 1970s (R. Dench, pers. comm.).
- Wellington 'mixed provenance zone' - mixed provenance western/eastern brown kiwi originating from captive populations have been released at Pukaha Mount Bruce and the Rimutaka Ranges.
- Hauturu - unclear whether residual kiwi remained and interbred with western brown kiwi introduced in the early 1900s to create the current population (Cowan 1939; H. Robertson, pers. com.).
- Pounui Island - mixed provenance western/Northland brown kiwi population established using birds from Hauturu and Northland (Holzapfel *et al.* 2008:35; managed under Northland brown kiwi taxon plan - Craig *et al.* in prep).

3.2 Biology and ecology

This information is taken from the Kiwi Best Practice Manual (Robertson *et al.* 2003) and Heather and Robertson (2005), unless otherwise indicated.

At Tongariro Forest, (H. Robertson, unpubl.) found that western brown kiwi females were 30-40% larger and heavier than males. Between 1992 and 2011, 28 adult females weighed 2215-3800 g (mean 2681 g) and 40 adult males weighed 1450-2750 g (mean 1932 g). The sexes could be differentiated by the longer bill length of the female compared to the male (109-132 mm, mean 124 mm, compared with 87-102 mm, mean 94 mm). Although the bill length will likely vary within the region, the differences between sexes should be clear within populations.

These kiwi are most vocal in winter and spring. The single drawn-out ascending whistle note of the male is repeated usually 15-20 times; the hoary guttural sound in the female usually repeated 10-20 times. The male call is often answered by its mate. They feed separately at night and spend around 20% of the days together, more when mating.

Pairs are mostly monogamous and are stable through and between years. The female produces one to two eggs (around 20 days apart) per clutch, and between one to two clutches (occasionally three) through the May to February laying season. Most are laid between June and December. The male alone incubates them for 75-90 days, and develops a brood patch.

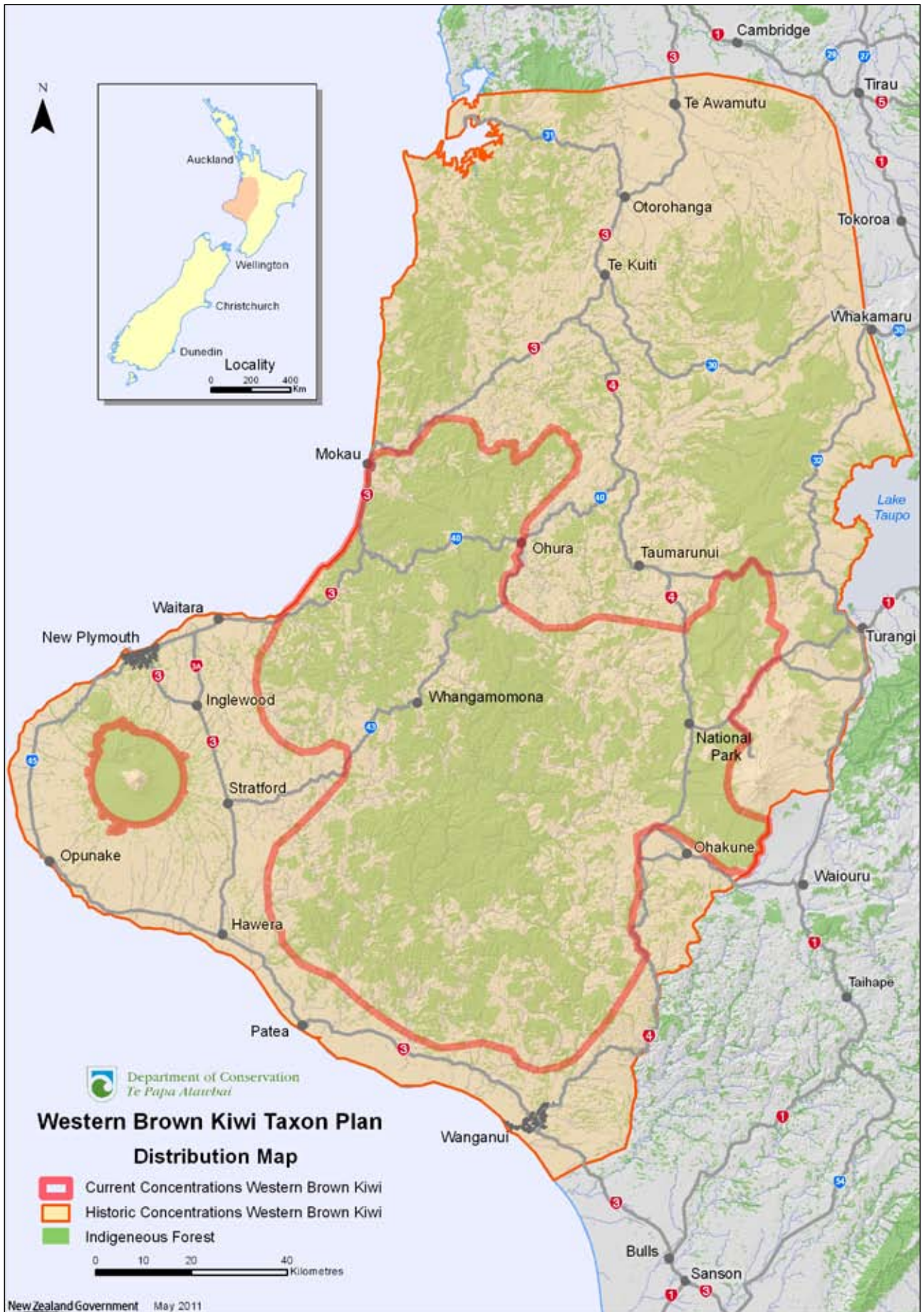
Western brown kiwi have low natural hatch rates in the wild of around 40-52%, compared to 60-90% through BNZ Operation Nest Egg at specialist captive facilities (e.g. Hood *et al.* 2010). Chicks are fully feathered when they hatch and leave the nest at around one to two weeks, after which they may remain in the parental territory or disperse from it. They grow to a size where they can defend themselves against stoats (over 1000 g) at around 180 days, and continue to grow until adulthood at around four and a half years old. Breeding occurs first at between one and eight years old. They have been recorded living to 30 years old in the wild, and can probably live to 60 years.

Adult brown kiwi territories range from 30 to 91 ha in size (Miles 1997). They nest and shelter in burrows, under vegetation, and in hollow logs in indigenous forest, scrubland, rough farmland and exotic forest. Their diet is mainly invertebrates including insect larvae, weta and crickets, cicadas, centipedes, moths, earthworms, spiders, and some fruits and occasional leaves. Food is taken from soil, rotten logs, or the substrate surface. The kiwi uses its bill to reach prey in the soil and rotting logs, leaving characteristic probe holes with their bill, occasionally scraping these out to 10 cm wide and 15 cm deep.

3.3 Past and present distribution and population trends

Brown and little spotted kiwi were both once widespread in the North Island, but the latter had died out by the late 1800s. In 1985, the western taxon was the most widespread of the four provenances of North Island brown kiwi, extending south from Kawhia Harbour to the southern boundary of its range along the Whangaehu River to the coast (Bull *et al.* 1985; Butler and McLennan 1991), and westwards to Tongariro and the western bays of Lake Taupo. A declining population occurred in the King Country. Kiwi were widespread in Pureora Forest Park and present in almost all parts of inland Taranaki and Whanganui, including Egmont National Park (Figure 1).

Figure 1: Past and present distribution of western brown kiwi.



Western brown kiwi are still fairly widespread today but their range has contracted in the north, particularly along its eastern fringes (Robertson *et al.* 2007). The population in Pureora Forest Park seems to have collapsed, reducing the total distribution by as much as 20%. There are few recent records from Kawhia Harbour and almost none from the King Country. A steady trickle of records from the Taumarunui area throughout the 1990s has almost totally faded away (N. Peet, DOC, pers. comm.). Call rates in Tongariro Forest suggest a decline of around 26% between the early-1990s and 2001, although call rates have increased since predator control began there. Kiwi populations are holding on better on the southern edge of their range, which appears to have changed little since 1985. The Matemateaonga Ecological District continues to be their stronghold.

Campbell and Dijkgraaf (2001) estimated the Matemateaonga Ecological District supported about 6000 - 11,000 adults, some 60% of which were on lands administered by DOC (170,000 ha), at densities around 2.5 - 4 adults/km². A conservative estimate of 1500 pairs is currently used. The population in northern Taranaki also seems substantial; perhaps in the vicinity of 2000 individuals, with probably another 500-1000 individuals scattered around the core areas. The Tongariro population is around 200 individuals within the Kiwi Sanctuary, with approximately 100 more on the southern slopes of Mt. Ruapehu, and unknown numbers scattered throughout the central North Island. Therefore the total population of the western taxon is probably at least 8000 - 10,000 birds (McLennan 2006, Holzapfel *et al.* 2008). Around 2000 pairs of kiwi are estimated to be protected (to varying degrees) by existing kiwi programmes according to 2010 estimates.²

3.4 Threat status

Brown kiwi, on the species level, are considered nationally vulnerable under the revised New Zealand Threat Classification system (Miskelly *et al.* 2008; Townsend *et al.* 2008). They are dependent on conservation to alleviate their partial decline and recruitment failure. Brown kiwi were previously in the 'serious decline' category in the 2005 species threat classification rankings (Hitchmough *et al.* 2007). While not listed to taxon level, western brown kiwi are considered, for the purpose of this plan, to be in the same threat category as the species (nationally vulnerable).

3.5 Agents of decline and current threats

Human-induced decline began with the arrival of Maori in New Zealand more than 700 years ago. The main causes of decline were probably habitat loss as a result of extensive burning and clearing of forest in the drier eastern parts of New Zealand, harvest by Maori, predation by dogs, and possibly competition with kiore (*Rattus exulans*). Together these led to extensive range reductions of kiwi. The rate and intensity of habitat destruction increased rapidly with European arrival in the mid-1800s and a new suite of efficient mammalian predators and competitors was introduced (McLennan *et al.* 1996).

Today, the rate of habitat loss has been greatly reduced but western brown kiwi are declining in all 'unmanaged' parts of their current range, even though most of them live in extensive tracts of indigenous forest that are legally protected and have high ecological integrity. Habitat protection alone is not sufficient for kiwi recovery. McLennan *et al.* (1996) estimated initially an average 5.8% population decline per annum across all North Island sites, though this figure has been revised to around 3 % per annum (Holzapfel *et al.* 2008). The decline is generally slower in extensive forest tracts with few predators of adult kiwi, and faster in small forest patches surrounded by farmland.

² based on 2010 estimates - c.1500 at Whanganui National Park, 350 at Purangi/Matau/ Pouiatao, 50 at Taranaki National Park, 10 at Karioi Rahui, 100 at Tongariro Forest and 10 at Maungatautari respectively

Currently, mammalian predators are the key agent of decline, particularly dogs (*Canis familiaris*), ferrets (*M. furo*), and stoats (*Mustela erminea*). Dogs and ferrets kill mainly adult and subadult kiwi, but stoats cause chronic population recruitment failure in unprotected populations by killing most kiwi chicks before they reach a body weight of 800-1100g (McLennan *et al.* 1996). For example, 87% of monitored first clutch chicks were killed by mustelids in 2008/09 at Tongariro Forest (Hood *et al.* 2009). Feral cats (*Felis catus*) can also be significant predators of kiwi chicks. Typically an unmanaged kiwi population suffers gradual decline through recruitment failure with intermittent, abrupt reductions caused by loss of adult kiwi to dog or ferret predation (e.g. Taborsky 1988; Pierce & Sporle 1997, Robertson *et al.* 2011). For instance, Tongariro Forest lost 24 transmittered adults across 3 years, predominantly due to ferret attacks (Sutton *et al.* 2011).

Adult kiwi can approach their natural life span of 50 years or more if risks to adults are reduced to very low levels. Consequently, populations can appear stable for years despite failure to recruit, until an eventual, and often quick, collapse.

3.6 Past and current management

The following sites and projects continue to facilitate the security and recovery of western brown kiwi, described from East to West (Figure 2).

3.6.1 Maungatautari Predator Proof Enclosure

Maungatautari Ecological Island is a 3,400 ha predator proof enclosure in the Waikato. It is the only fenced site large enough to hold a substantial self-sustaining kiwi population. For the last 10 years work has focused towards introducing 40 - 50 unrelated kiwi onto the mountain from which to found a permanent population of close to 300 kiwi. Once this population reaches carrying capacity on the mountain, chicks over 1 kg would be transferred to sustain populations in the wild, acting as 'kohanga kiwi' (source sites). Pairs have already begun breeding before the 50 founders have been released, and therefore chicks have been exported to wild populations since 2010 to prevent genetic over-representation of the original founders.

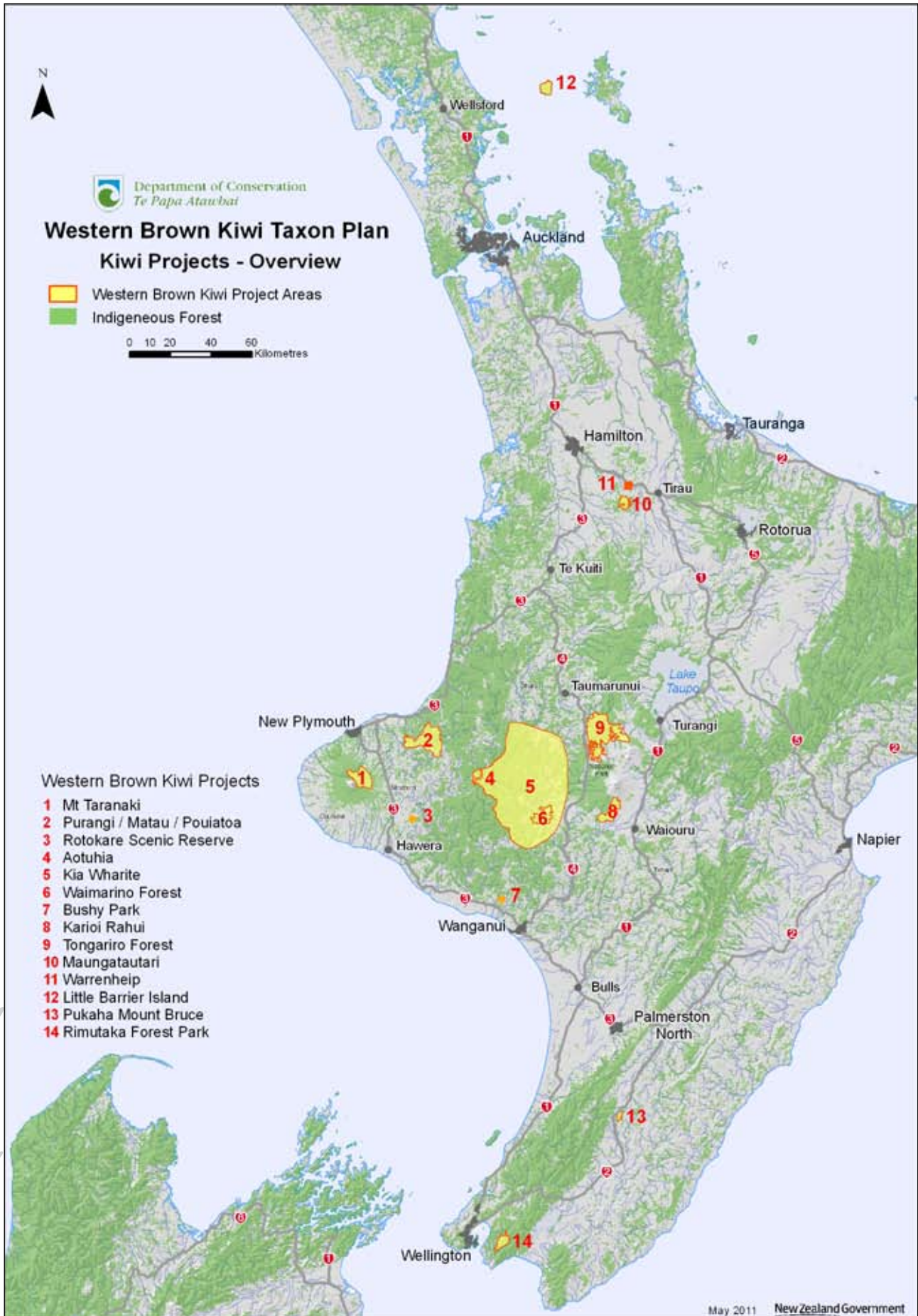
3.6.2 Tongariro Forest Kiwi Sanctuary

Tongariro Forest Kiwi Sanctuary is one of five kiwi sanctuaries established nationally in 2000 to develop and improve techniques in kiwi protection, specifically aiming to increase the survivorship of young kiwi. Tongariro Forest is unique from the other sanctuaries as it is researching the benefits to kiwi of aerial 1080 when used as the principal management method. This 20,000 ha Conservation Area contains an estimated 200 birds. The trials have revealed that pre-fed aerial 1080 significantly increased kiwi chick survival for two years post-operation. Another cycle of 1080 will be undertaken in 2011 with pre and post chick survival recorded. Further research is focussed on sub-adult survival rates, dispersal and territoriality/breeding age.

3.6.3 Karioi Rahui and Waimarino Forest

Karioi Rahui is part of a 10,000 ha Conservation Area on the southern slopes of Mt Ruapehu, with stoat traps covering 3500 ha. Between 2000 and 2009, 30 BNZ Operation Nest Egg (ONE) chicks from Waimarino Forest (a 13,500 ha block consisting predominantly of exotic forest, with some intact native stands) were returned to Waimarino Forest to restore the remnant population, and 37 ONE chicks were released at Karioi Rahui. Since 2009, ONE has occurred at each site independently (i.e. birds returned to source site). It is estimated that there are now about 100 birds around Karioi Rahui and 200 birds in Waimarino Forest.

Figure 2: Location of western brown kiwi projects as described in this plan.



3.6.4 **Kia Wharite Biodiversity Project**

The Kia Wharite Biodiversity Project comprises of a partnership between Horizons Regional Council, Department of Conservation, landowners and iwi. The overarching goal is to manage and improve close to 180,000 ha of public conservation and private land to manage biodiversity at a landscape scale. This is achieved primarily through 3-yearly cycles of aerial 1080. This work includes the Matemateaonga Ecological District thought to support about 1500 pairs of kiwi. One of the primary goals of the project is to grow the kiwi population by 10% every 3 years.

3.6.5 **Taranaki**

3.6.5.1 ***Taranaki Kiwi Trust***

Aotuhia (Whangamomona Conservation Area) provides a donor kiwi population for a ONE project run by the Taranaki Kiwi Trust. A proportion of juveniles produced from here (13 in total) have gone to Maungatautari to help establish their founder population. Since 2009 50% of juveniles sourced from 8 - 10 pairs are released back at the source site at Aotuhia, and the others supply the Egmont National Park remnant kiwi population (thought to be about 40 pairs in 2003 – Peet 2003). There is no predator control at Aotuhia, but ground-based mustelid control covers 7500 ha of Egmont National Park, including the majority of known kiwi habitat. Predator trapping is supplemented by infrequent aerial 1080 drops. Chicks have also been released on the mountain sourced from Purangi (private land), although this no longer occurs.

3.6.5.2 ***East Taranaki Environment Trust (ETET)***

“Saving kiwi in Taranaki” is a project based in East Taranaki and includes the areas of Purangi, Matau and Pouiatua. The project is a partnership between ETET, Taranaki Regional Council and Waitara Maori Women’s Welfare League, and has support from private landowners and iwi. Predator control is ground based with trapping and poison. The project area is currently 13,000 ha. Baseline kiwi call surveys have started with an estimate of 350 pairs within the area. The project has a landscape management approach.

3.6.5.3 ***South Taranaki***

South Taranaki Forest and Bird volunteers undertake predator control on 450 ha of privately owned, mainly regenerating native vegetation in the Totaras with a small kiwi population managed *in situ* through predator trapping. They also do predator trapping across 400 ha of the Collier-Dixon Covenant block, a privately owned covenanted area of mature native forest bordering Lake Rotorangi.

Lake Rotokare Scenic Reserve in Southern Taranaki is a 230 ha forest wetland and lake reserve surrounded by a predator-proof fence. This site is currently being used as a crèche supporting the Taranaki ONE projects, and may evolve into a kohanga kiwi site.

3.6.6 **Mixed provenance populations**

There are approximately 500 pairs of mixed provenance kiwi on Hauturu/Little Barrier Island. Western brown kiwi were first introduced before 1903 and again in 1919, and may have interbred with resident kiwi who are assumed to have remained present on the island throughout its history. The offspring of these kiwi are an important source for reintroductions into Pukaha/Mount Bruce and the Rimutaka Range, two localities where brown kiwi are being re-established in the Wellington region. Pukaha Mount Bruce protects about 30 kiwi over 950 ha through intensive trapping. Situated in the Rimutaka Forest Park (RFP), and now spreading into the Wainuiomata/Orongorongo



Water Collection Area (Greater Wellington Regional Council), the Rimutaka kiwi project is managed by the Rimutaka Forest Park Trust. Over 1000 ha is currently being trapped, protecting about 50 kiwi (January 2011). These populations are incorporated in the western brown kiwi taxon plan.

3.6.7 Incubation and crèche facilities

Rainbow Springs Kiwi Encounter hatches most western brown kiwi eggs from ONE projects. This captive incubation, hatching, and rearing facility operates within a tourist wildlife complex in Rotorua, and their staff are experts in incubating and hatching kiwi eggs. Chicks from Rainbow Springs were usually crèched in smaller predator-fenced areas such as Bushy Park (96 ha enclosure outside Whanganui) and Warrenheip (16 ha enclosure outside Cambridge) where the chicks grow and benefited from wild conditioning in safety. However, at time of writing both these enclosures are not in use.

Lake Rotokare Scenic Reserve is currently the only available crèche site, although Wairakei Golf and Sanctuary, a 150 ha predator proof enclosure based in Taupo, was at time of writing obtaining approval to act as a crèche.

3.6.8 Captive breeding

Around 25 western brown kiwi are currently part of a captive breeding programme directed by a national coordinator. The programme has required occasional additions from wild populations to maintain genetic health among the breeding birds, so kiwi produced through the programme are suitable for release to the wild. More information is available through the Captive Management Plan for kiwi (Barlow 2011). A few individuals held for advocacy or held temporarily for rehabilitation currently fall outside the Captive Management Plan, but are subject to the Brown Kiwi Husbandry Manual, and to DOC's captive management policy and standard operating procedure which stipulate requirements for holding them.

3.7 Cultural importance

Kiwi have a special significance to all New Zealanders. They have become a prominent and distinctive national icon, cherished by all cultures. Kiwi are a symbol of the uniqueness of New Zealand and the value of our natural heritage. Most New Zealanders have an interest in the protection of kiwi, and many are willing to become actively involved in this work.

Tangata whenua also have a strong cultural, spiritual and historical association with the bird. They regard kiwi as taonga, and generally wish to exercise the principle of kaitiakitanga (guardianship) in decisions about the care and protection of kiwi and their habitats. This interest is recognised through the Treaty of Waitangi, and has been included in the legislation that binds the Crown.

The Department of Conservation will give effect to the principles of the Treaty of Waitangi in decisions about the management of kiwi. This obligation is more clearly laid out in Conservation General Policy, which describes the relationship between conservation legislation such as the Conservation Act 1987 or the Wildlife Act 1953 and the Treaty of Waitangi. As part of its strategic direction DOC will work with tangata whenua to identify mutual interests and ways of working together in the interests of conservation (DOC 2008).

3.8 Public awareness

Kiwi are an inspiring and iconic species for most New Zealanders. They provide a rallying point for a range of advocacy tools that help to reach a wide audience, such as regular media items on kiwi releases and other community protection initiatives, face to face talks, interpretive displays, and publications. Targeted tools are used for more specific audiences such as avian aversion training to advocate for dog control, and co-operative projects where kiwi protection is the common ground that unites different parties and interest groups.

A critical part of DOC's role is to encourage community initiatives and empower groups promoting the protection of kiwi and their habitat, by providing technical advice on kiwi conservation work. DOC is the co-ordinating and authorising agency for work on kiwi, which includes assessing and managing permits to catch, handle, and transfer kiwi, and to keep kiwi in captivity.

3.9 Recovery principles and preferred option for recovery

The selection of goals, objectives and actions in this plan have been directed by the following underlying recovery principles and preferred 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 distribution 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.

Western brown kiwi

The following principles are specific to this taxon:

- The best approach for western brown kiwi is to protect a range of self sustaining wild populations over their natural range through predator control. This will also benefit the wider ecosystem.
- Securing support for predator control in existing kiwi populations is the key to security from extinction and to recovery for western brown kiwi.
- The involvement of an array of agencies and groups will be needed to achieve security for western brown kiwi.
- Cooperation between individually managed populations is essential to protect and recover western brown kiwi.

4 Goals

4.1 Long term recovery goal

Long-term goal of the national recovery plan

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

Long-term goal of the Western Brown kiwi taxon plan

To restore western brown kiwi as a functioning part of natural and managed ecosystems throughout their natural range.

4.2 Goals for the term of this taxon plan

Management

- Goal 1 To halt the overall decline of western brown kiwi (in relation to baseline estimates from the 2008 population size and distribution) (*cf. Recovery Plan Goal 1.2*)
- Goal 2 To achieve population growth within managed populations by protecting at least 2500 pairs in a range of self-sustaining populations by 2019
- Goal 3 To minimise the loss of genetic diversity of populations in the wild (*cf. Recovery Plan Goal 1.3*)

The minimum goal is to protect 2500 pairs of western brown kiwi, as recommended by technical review and draft management plans for this taxon (McLennan 2006, DOC 2007a). One objective in the Kiwi Recovery Plan of securing a minimum of 500 pairs (Holzapfel *et al.* 2008: Objective 9.1) has already been achieved by recent initiatives.

Community Relations and Engagement

- Goal 4 To increase and strengthen support for western brown kiwi recovery across a broad range of sectors of New Zealand society (*cf. Recovery Plan Goal 2.1*).
- Goal 5 To facilitate education and advocacy opportunities associated with western brown kiwi.
- Goal 6 Support community-led projects in kiwi recovery by sharing best practice and technical knowledge to optimize recovery efforts.
- Goal 7 To ensure tangata whenua are involved in management of kiwi populations within their rohe.³

Research and Innovation

- Goal 8 To clarify the taxonomy of western brown kiwi, especially the provenance of the Hauturu/Little Barrier Island population (*cf. Recovery Plan Goal 3.1*).
- Goal 9 Investigate gene flow and genetic diversity between populations throughout western brown kiwi range (with emphasis on populations predominantly restored through ONE).
- Goal 10 To undertake robust population modeling for western brown kiwi to determine overall status of the taxon (*cf. Recovery Plan Goal 3.2*).
- Goal 11 To undertake or support research into tools for sustainable landscape scale predator management (*cf. Recovery Plan Goal 3.3*).
- Goal 12 To improve western brown kiwi population status and trend monitoring.

³ Rohe is the word used by Maori to describe the territory or boundaries of tribal groups.

5 Implementation

The following section outlines the objectives and actions required to achieve the above goals. Relevant objectives and actions from the national Kiwi Recovery Plan have been included with any additional objectives specific to western brown kiwi. A range of actions required to meet these have been developed, then numbered, prioritised, and given a timeframe for completion. A summary table of actions is provided as Appendix 1.

The priority for each action was determined using these criteria:

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

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

Actions are predominantly time lined until 2015 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 2015.

Abbreviations used are:

- BNZSKT - BNZ Save the Kiwi Trust
- CO - Department of Conservation conservancy
- CSM - DOC conservation support manager
- DOC - Department of Conservation
- ETET - East Taranaki Environment Group
- HRC - Horizons Regional Council
- ONE - BNZ Operation Nest Egg
- KRG - Kiwi Recovery Group
- R&D - Department of Conservation Research and Development Group
- RPA - Recovery Plan action taken from the Kiwi Recovery Plan
- RPO - Recovery Plan objective taken from the Kiwi Recovery Plan
- TKT - Taranaki Kiwi Trust
- TRC - Taranaki Regional Council
- TWT - Tongariro Whanganui Taranaki Conservancy
- WBKG - western brown kiwi group

5.1 Management

Extensive *in situ* predator control over extant western brown kiwi populations is a key tool for recovery of western brown kiwi. Several management projects are required to maintain them across their natural range. While any kiwi or restoration project can be good for conservation, finite resources mean that recognising and prioritising key western brown kiwi populations is part of the strategy to secure this taxon. Criteria which suggest a population is a high priority are:

- Large numbers of kiwi present (e.g. 100 pairs or more), with the potential for population growth
- Security of habitat (land use and land tenure).
- Predators (stoats, ferrets, cats, dogs) managed on a large scale (e.g. 10,000 ha).
- Security of resourcing for ongoing site management.
- Concurrent protection of other rare or threatened species or ecosystems.
- Clear, achievable objectives and strong project planning.
- Support from community.
- Support or management from tangata whenua.
- Investigation of key research questions.

Currently the populations which are a priority for securing and recovering western brown kiwi are the large Matemateonga population recently protected in the Tautea Kia Wharite (Whanganui National Park), and the large Purangi/Matau/Pouiatoa population recently protected in Taranaki. The next largest populations currently under management are at Tongariro Forest Kiwi Sanctuary (which also conducts essential research) and Egmont National Park. In terms of a secure protected habitat, large carrying capacity, and range extension, Maungatautari Ecological Island (Maungatautari Mountain Scenic Reserve, Waikato Conservancy) is a priority site.

The criteria above will help determine how new kiwi projects are integrated into western brown kiwi recovery. They provide an objective framework to help guide the allocation of scarce resources.

5.1.1 Implementation of taxon plan

The function of the taxon plan is to translate the broad strategies of the Kiwi Recovery Plan into deliverable, specific actions to guide local operational and work planning for western brown kiwi. It needs to provide clear, long-term strategic conservation targets on which all interested parties can focus their efforts. The process of developing the plan has assisted in communicating and achieving recovery goals, and subsequent regular reviews should ensure the goals in the taxon plan remain relevant and useful.

Issues

- The national recovery plan does not provide sufficient detail to guide implementation for individual taxa.
- Taxon plans need to be consistent with the national recovery plan while stating local solutions.
- Western brown kiwi recovery involves many stakeholders across several conservancies.
- The level of DOC resourcing available for western brown kiwi protection is limited. Although it is an iconic species, it is currently secure. Achieving the recovery goals in this plan is strongly dependant on community involvement.

Objectives and Actions

OBJECTIVE
1. The western brown kiwi taxon plan remains relevant and provides effective guidance for annual work plans.

ACTIONS				
	Action	Timeframe	Priority	Accountability
1.1	Develop a western brown kiwi group (WBKG) to assist with implementation and regular reviews of the taxon plan, and co-ordinate/ communicate/ resolve issues for this taxon.	By 2011	Essential	Conservators
1.2	WBKG to meet if required after every second breeding season, or more frequently when required. Review progress of taxon plan at this time	Biennial	Medium	WBKG / Conservators
1.3	WBKG to consult and involve the Kiwi Recovery Group in strategic and management decision making.	Ongoing	High	Conservators / Project managers

5.1.2 Minimum secure populations

Some large populations remain in extensive areas of kiwi habitat, even though the taxon is still declining in unmanaged areas. Suitable populations, sites, and methods, are available to meet the goal of securing at least 2500 pairs of western brown kiwi during the term of this plan. This will involve various projects spread through the taxon's natural geographic range and include community, tangata whenua, and DOC initiatives. There may already be nearly 2000 pairs of kiwi protected, primarily through the new large Tautea Kia Wharite and Purangi/Matau/Pouiatua projects in Whanganui and Taranaki. The Kiwi Recovery Plan objective (cf. RPO 9.1) of securing a minimum 500 pairs of brown kiwi has been achieved for the western brown kiwi taxon, at least in the short-term.

Issues

- Predation from stoats remains the key agent of decline for western brown kiwi populations. Predation from ferrets and dogs is also significant.
- Predator control is expensive and sites are subject to constant reinvasion pressure.
- Juvenile kiwi can disperse great distances from their natal area and can move from protected areas into areas of high predator densities.
- Securing funding for predator control is the key issue for securing western brown kiwi in the long-term.
- Currently an estimated 2000 pairs are protected through predator control. This makes the 2500 pair objective realistic and achievable.

Objectives and Actions

OBJECTIVES
2.1 A minimum of 2500 pairs of western brown kiwi are secure from key agents of decline during the term of this plan.
2.2 Increase the population in Whanganui National Park by 10% every three years.
2.3 Secure 500 pairs of kiwi at Purangi/Matau/Pouiatua by 2015.
2.4 Protect 200 pairs of kiwi at Tongariro Forest by 2017.
2.5 Western brown kiwi are managed over as large a part of their historical range as possible (cf. RPO 13.1).

ACTIONS				
	Action	Timeframe	Priority	Accountability
2.1	Protect the large population of around 1500 kiwi pairs [†] at Tautea Kia Wharite (Whanganui National Park) by controlling relevant predators with broadscale aerial 1080 [§] .	Ongoing, 3 yearly 1080 [§]	Essential	TWTConservator/HRC
2.2	Protect the large population of around 350 kiwi pairs [†] at Purangi/Matau/Pouiatoa (Taranaki) by controlling relevant predators.	Ongoing trapping	Essential	ETET/TRC
2.3	Protect the population of around 100 kiwi pairs [†] in the Tongariro Forest Kiwi Sanctuary (central North Island) by controlling relevant predators and supplementing the population with ONE.	Ongoing, regular aerial 1080	High	TWT Conservator
2.4	Protect the population of around 60-70 kiwi pairs [†] in Egmont National Park (Mt Taranaki) by controlling relevant predators, supplementing the population with ONE, and examining options for sustainable predator management and funding for Egmont National Park kiwi project.	Ongoing, trapping supplemented or replaced with aerial 1080	High	TWT Conservator/TKT
2.5	Explore options for fully protecting the population of 20-30 pairs of kiwi at Rangataua Conservation Area, and implement if appropriate.	Throughout term of plan	Medium	TWT Conservator
2.6	Explore options for implementing predator control at Waimarino Forest to protect approximately 100 pairs of kiwi.	Throughout term of plan	High	TWT Conservator, Earnslaw One Ltd

[§] or at suitable intervals for kiwi protection determined by evolving research on broad scale 1080 for kiwi protection.

[†] estimated, as at 2010

The managed population at Maungatautari is covered under section 5.1.5 Kohanga kiwi.

5.1.3 Unmanaged populations

Until 2008 no large populations of western brown kiwi were protected from predators; this has changed rapidly with the initiation of both the Tautea Kia Wharite and Purangi/Matau/Pouiatoa projects in Whanganui and Taranaki. However, western brown kiwi continue to decline by an estimated 3% in areas where their threats are not managed (Holzapfel *et al.* 2008) and local extinctions similar to what occurred in Pureora are likely to continue. There may be opportunities to establish additional protected populations within the historic range of each kiwi taxon, ideally by stoat, ferret, cat and dog control over at least 10,000 ha of suitable kiwi habitat.

Issues

- Despite local population stability or increases at managed sites, brown kiwi are still declining overall.
- Local extinctions are likely to continue throughout the western brown kiwi range.
- The current distribution of western brown kiwi within their historical range is unclear.

Objectives and Actions

OBJECTIVE
3.1 Manage a sufficient proportion of the population of western brown kiwi to ensure that the net rate of loss over the whole taxon is zero (cf. RPO 10.1).

ACTIONS				
	Action	Timeframe	Priority	Accountability
3.1	Provide technical advice and encouragement to new kiwi programmes as appropriate, placing a higher priority on any initiative which will secure a large population kiwi.	Ongoing	Essential	Area managers/ Programme managers
3.2	Investigate the feasibility of controlling predators at sites with populations of 50-200 pairs (e.g. Northern Taranaki forests) where management does not currently occur. Implement findings where appropriate.	By 2011	High	WBKG
3.3	Continue to determine the distribution and relative abundance of remnant kiwi populations in unmanaged areas.	By 2018	Medium	DOC/Community groups
3.4	Create a centralized database of western brown kiwi distribution data collated from past work, and add future survey data throughout the term of the plan.	By 2012 and ongoing	Medium	Technical Support

5.1.4 Tongariro Forest Kiwi Sanctuary

Tongariro Forest is one of five kiwi sanctuaries established in 2000 by DOC to develop successful management prescriptions for kiwi protection at key sites, and for fundamental kiwi ecology research (DOC & MfE 2000). They remain a key component of kiwi recovery (Holzapfel *et al.* 2008). The focus for Tongariro Forest sanctuary has been to determine whether 1080 is an effective management tool for protecting kiwi. Work at Tongariro shows the local kiwi population increased at 6% per year in the 1080 and immediate post-1080 years through reduced predation (de Monchy *et al.* 2009). However, in recent years ferrets have killed a third of the male population under surveillance and have posed a serious threat not only to the study, but also to the population as a whole. This suggests that both stoats and predators of adult kiwi need to be managed to secure remnant populations.

Issues

- Sanctuary findings are not always published in peer-reviewed literature.
- The Tongariro 1080 experiment requires repetition and replication to confirm the outcomes for kiwi.
- Adult losses due to ferrets threaten the sanctuary's ability to obtain robust sample sizes for the experiment.
- Adult losses due to ferrets threaten the sanctuary's ability to reach their goal of 200 pairs by 2017.
- There is a perception of 'sacrificing' chicks during non-treatment years which reduces support within the community.

Objectives and Actions

OBJECTIVES	
4.1	Tongariro Forest Kiwi Sanctuary is an integral part of kiwi recovery as a site of successful management and learning (cf. RPO 3.1).
4.2	Investigation of 1080 as a management tool for kiwi populations over large areas provides information for kiwi management on a national scale.
4.3	Key research findings and management results are communicated widely to other sanctuaries and kiwi projects to inform their management, planning and advocacy.
4.4	Community support for the research and use of 1080 as a tool for kiwi recovery is obtained.

ACTIONS				
	Action	Timeframe	Priority	Accountability
4.1	Control predators in Tongariro Forest Kiwi Sanctuary with broadscale 1080 in conjunction with AHB.	2011 and ongoing	Essential	TWT Conservator
4.2	Robustly monitor kiwi chick survival and mustelid tracking rates pre- and post-1080 operation.	Until 2013	Essential	Programme Manager
4.3	Monitor sub-adult survival, dispersal and territory/ breeding age.	Until 2012	Essential	Programme Manager
4.4	Communicate key findings of 1080 experiment to other sanctuaries and kiwi projects, kiwi recovery group, stakeholders and community.	Annually	Essential	Programme Manager/ Technical Support
4.5	In conjunction with the KRG, review the focus of the Tongariro Forest Kiwi Sanctuary after the completion of the 1080 experiment.	2013	Essential	Programme Manager/ Technical Support/KRG
4.6	Use the kiwi sanctuary network for dialogue, information and staff exchange.	Ongoing	Medium	Sanctuary Programme Managers

5.1.5 Kohanga kiwi

Kiwi populations under sustained management are considered to be in the recovery phase as numbers increase towards carrying capacity. Eventually surrounding unprotected areas will become a sink for dispersing juveniles. These juveniles could be used to contribute birds to other protected populations, or to re-establish kiwi within their former range where protection is available. These source areas have been coined as 'kohanga kiwi' ('kiwi nest', i.e., source population) sites. Predator proof enclosures have the potential to be highly effective kohanga kiwi sites since the kiwi are protected and as closed populations, kiwi will need to be released to avoid crowding.

At the time of writing Maungatautari Ecological Island predator proof enclosure is being developed as a kohanga kiwi site. A founding population of at least 40 unrelated founders is needed to establish the site. Eventually juveniles can be removed once the population reaches carrying capacity (estimated to be around 300 birds) and released back into the wild to supplement kiwi populations. The Lake Rotokare Trust is also exploring the possibility of becoming a kohanga kiwi site.

Issues

- Obtaining sufficient kiwi to establish a founder population within a predator proof enclosure is difficult.
- It is difficult to assess when a population is near or has reached carrying capacity.
- Translocations of kiwi are dependant on successful consultation with stakeholders.

Objectives and Actions

OBJECTIVES	
5.	Kohanga kiwi sites are regularly supplementing other populations in the wild and are used as an effective kiwi recovery tool.

ACTIONS				
	Action	Timeframe	Priority	Accountability
5.1	Enhance existing projects to increase local population abundance to the point where the population can be used as kohanga kiwi, a source for other sites (cf. RPA 10.2).	Ongoing	High	Conservators
5.2	Establish a founder population of at least 40 kiwi related into Maungatautari predator proof enclosure (not closely to establish a population of close to 300 kiwi, to be used as a kohanga kiwi.	Stock by 2015; maintenance ongoing	Essential	Conservators/MEIT/tangata whenua
5.3	Investigate the potential for new kohanga kiwi sites within western brown kiwi range.	Ongoing	Medium	Conservators/ WBKG

5.1.6 BNZ Operation Nest Egg (ONE) and kiwi crèches

ONE is a widely used technique for supplementing kiwi populations in the wild. Eggs taken from the wild are incubated and hatched in captivity and chicks are reared in crèche facilities, most commonly predator proof enclosures. Juveniles are then released back into the wild where they are likely to grow and breed successfully once they have reached weight of c. 1000-1200g. Genetic diversity needs careful consideration because of a tendency to focus on a few productive parents when sourcing eggs. Ensuring the donor population's juvenile recruitment rates are not unacceptably reduced is also important, and may involve predator control or returning some ONE juveniles to the source.

Individuals throughout the range of western brown kiwi are hosted at ONE and crèche facilities, so there is the potential to swap individuals at these sites as part of the genetic management of small populations, provided the source sites are prepared to collaborate.

Issues

- ONE for western brown kiwi lacks coordination.
- Institutions and facilities for incubation, hatching and crèching are essential for ONE, but their funding and capacity is frequently uncertain.
- There are currently a very limited number of crèching sites available. At time of writing only Rotokare is established as a crèche for Taranaki kiwi chicks.
- There is often no clear monitoring or reporting structure in place for crèche facilities.
- Extensive use of limited numbers of parent birds is common in ONE and can affect genetic diversity in the resulting population.
- Sites with predator proof fences are under constant threat of predator incursions, which can impact on the young kiwi held at the site.

Objectives and Actions

OBJECTIVES	
6.1	The use of BNZ Operation Nest Egg is effective and undertaken to a high standard (cf. RPO 17.1).
6.2	Communication between kiwi projects, DOC managers, captive institutions and crèche facilities involved with western brown kiwi is undertaken on a regular basis.
6.3	There are enough crèche facilities to meet the demand of priority ONE operations undertaken.
6.4	Crèche facilities operate at a consistently high standard, with appropriate monitoring and incursion plans in place.

ACTIONS				
	Action	Timeframe	Priority	Accountability
6.1	Forecast demand for ONE and crèche facilities and discuss with institutions annually prior to breeding season.	Annually	Medium	Project Managers/ WBKG/captive coordinator
6.2	Use transparent and objective criteria on recovery priorities (listed in s5.1) when determining how limited space or resources are allocated.	Ongoing	High	WBKG / KRG
6.3	Identify in management plans how genetic issues will be managed during ONE to maintain population health.	Ongoing	High	Project Managers
6.4	Review projects undertaking ONE to determine the contribution of chicks made to a population from ONE breeding pairs and ensure prolific pairs are not over-represented in receiving populations.	By 2011	High	Project Managers
6.5	Evaluate impact of ONE on the source population and return a proportion of juveniles or initiate predator control if deemed appropriate.	Ongoing	High	Programme Managers
6.6	Ensure sites with predator proof fences have adequate predator incursion response and monitoring plans in place.	Ongoing	Essential	DOC/crèche managers
6.7	Support initiatives to develop new crèche sites (e.g. Wairakei) if demand for new sites are present.	Ongoing	High	DOC

5.1.7 Captive management

Captive breeding has successfully been used as a tool in threatened species recovery, and is an effective advocacy tool. However, the current captive breeding population of western brown kiwi has been founded by only seven birds, and their bloodlines are therefore overrepresented. A further 14 birds would be required to establish a viable breeding population, but removing birds from the wild into captivity is not a priority for recovery of this taxon. Therefore a recent review by the captive coordinator has determined that western brown kiwi should be phased out of captivity as there is limited conservation value in retaining the programme. Birds in captivity for the purposes of rehabilitation are exempt from this.

Issues

- The western brown kiwi captive population does not meet genetic diversity requirements.
- Commitments between the captive coordinator, conservancies and participating captive institutions about where kiwi will be released are not always clear or formalised.

Objectives and Actions

OBJECTIVES
7. Western brown kiwi are phased out of the captive management programme.

ACTIONS				
	Action	Timeframe	Priority	Accountability
7.1	Clarify existing agreements regarding release of captive kiwi offspring and any ongoing commitments.	By 2011	High	Programme Manager/ iwi/captive coordinator
7.2	Phase out all western brown kiwi from captivity unless held for rehabilitation	2011, then ongoing	Essential	Captive coordinator/ Captive managers/ Area Managers

5.1.8 Genetic diversity

Genetic bottlenecks are a management risk in any small population (e.g. new and small remnant populations). Translocations of unrelated kiwi may be required to address this. A precautionary approach to movement of individual kiwi has been proposed to maintain fine-scale diversity by minimising mixing of birds between geographic extremes and natural boundaries (Holzapfel *et al.* 2008:36). However, there is likely to be little immigration into a managed population from unprotected areas, and therefore genetic diversity is in all probability reducing over time.

Translocating birds between existing projects would mitigate this genetic loss to some extent, and mimic some of the natural immigration that is now lost. There are opportunities to do so within existing ONE programmes e.g. movement of birds between Tongariro, Karioi Rahui, Waimarino, Taranaki and Maungatautari.

Issues

- Natural trickle immigration which once maintained genetic diversity no longer occurs in isolated kiwi populations. It can be mimicked by occasional translocations into managed kiwi populations.
- Genetic issues are not always recognized as part of population management.
- Kiwi projects operate in isolation from each other and the taxon is not managed as a single unit. This plan must address this important issue.

Objectives and Actions

OBJECTIVES	
8.1	Genetic integrity is maintained within the western brown kiwi taxon at the appropriate scale (cf. RPO 13.2).
8.2	The loss of genetic diversity of western brown kiwi in secured populations is minimized.

ACTIONS				
	Action	Timeframe	Priority	Accountability
8.1	Manage western brown kiwi as a separate conservation management unit to other brown kiwi taxa throughout the term of the plan (cf. RPA 13.3).	Ongoing	Essential	Area managers/ conservators
8.2	Manage populations within western brown kiwi range as much as feasible to maintain fine-scale diversity by minimising translocations between geographic extremes and natural boundaries throughout the term of the plan (cf. RPA 13.4).	Ongoing	Medium	Area managers/ conservators
8.3	Identify in management plans and translocation proposals how genetic issues will be managed to maintain population health.	By 2011 and ongoing	Medium	Project manager

Action	Timeframe	Priority	Accountability
8.4	Carry out translocations into managed kiwi populations if required to maintain genetic diversity, with approval from KRG.	Ongoing	High PM Biodiversity/Area Managers/WBKG

5.1.9 Mixed provenance populations

Existing mixed provenance populations have arisen because of human-induced mixing between kiwi populations. The original release of kiwi into RFP and to Pukaha/Mount Bruce served the dual objective of establishing new populations and reducing the mixed provenance population in captivity, allowing captive institutions to increase their taxon-specific breeding program. Despite their origin at least partially as a solution for a problem (mixed provenance in captivity), these populations are now part of the national recovery planning framework for brown kiwi. This requires future releases to be from appropriate sources.

Given the origin of the current birds such sources are within the western or eastern taxa or from within other mixed provenance populations of these two taxa. Further transfers from these sources will allow the population to either maintain its current status or, over time, develop into a predominant western or eastern North Island taxon population.

The possible mixed provenance kiwi population on Hauturu/Little Barrier Island (western birds plus perhaps some remnant island birds) is an important source for translocation into mixed provenance populations at Pukaha/Mt Bruce and the Rimutaka Ranges. A mixed provenance kiwi population is also established on Pounui Island, thought to be a mix between Northland and Hauturu kiwi. Their management is covered in the Northland Brown Kiwi Taxon Plan (Craig *et al.*; in prep).

Issues

- The taxonomic status of kiwi at their distributional boundaries is not always clear.
- The exact origins of the population on Hauturu are unclear. A unique feather louse suggests brown kiwi may already have been present and mixed with western brown kiwi when released (Colbourne 2005).

Objectives and Actions

OBJECTIVES
9.1 The mixed-provenance populations continue to be integrated into the national recovery framework for kiwi, using them as source populations for translocations and designating 'mixed-provenance zones', i.e. areas between existing taxon boundaries where mixing between eastern and western taxa could have occurred naturally (cf. RPO 13.3).
9.2 The genetic status of Hauturu kiwi is clarified.
9.3 The Hauturu kiwi population is available to supplement or establish mixed lineage populations within the defined "mixed provenance" zones.
9.4 Distribution and taxon of brown kiwi around taxon boundaries is clarified.

ACTIONS			
Action	Timeframe	Priority	Accountability
9.1 Clarify genetic status of Hauturu kiwi to help determine their role in western brown kiwi recovery (cf. RPA25.2).	By 2013	Medium	R&D

	Action	Timeframe	Priority	Accountability
9.2	Maintain the predator free status of Hauturu to secure the population present on the island.	Ongoing	High	Auckland Conservator
9.3	Assist the Rimutaka Forest Park Trust to maintain the predator control over 1000 ha or more to protect the mixed provenance population present there.	Ongoing	Medium	Wellington Conservator
9.4	Maintain the predator control over c. 1000 ha at Pukaha Mount Bruce to protect the mixed provenance population present there.	Ongoing	Medium	Wellington Conservator
9.5	Undertake ONE where appropriate to supplement mixed provenance populations at Rimutaka and Pukaha Mount Bruce	Ongoing	Medium	Wellington Conservator
9.6	Designate mixed-provenance zones by 2012 and avoid creating new mixed provenance kiwi populations outside designated zones.	By 2012 and then ongoing	Essential	Conservators/Project Managers
9.7	Confirm distribution and taxon of kiwi near taxon boundaries in the Ruahine/Rangitikei, Kaimai, and Kaimanawa areas.	By 2015	Medium	R&D/ Project Managers

5.1.10 Information sharing

Information on best practice in kiwi management has been developed and summarised in the Kiwi Best Practice Manual and various other management plans and guidelines, available from DOC. These manuals are updated as new information becomes available. However, most projects involving western brown kiwi operate in isolation and are often unaware of successes or failures experienced by other groups. Sharing of information between groups facilitates greater learning and a support structure for western brown kiwi management.

Issues

- The kiwi best practice manual requires regular updates.
- It can be difficult to maintain current knowledge of developing techniques for kiwi management.
- Data management is inconsistent across kiwi projects with regard to the procedures and technology used. Data management procedures are not regularly updated due to a lack of available software and consistent protocols. This increases the risk of unnecessary effort, inability to effectively manage, report or research kiwi data, and even data loss across kiwi projects.
- Some community kiwi projects would like greater access to data sharing or information sharing across projects.

Objectives and Actions

OBJECTIVES	
10.1	Key management results and research findings are communicated to other kiwi projects to inform their management planning and advocacy.
10.2	Western brown kiwi management best practices are made available and distributed to stakeholders.
10.3	Data from kiwi recovery projects are adequately managed (cf. RPO 14.1).

ACTIONS				
	Action	Timeframe	Priority	Accountability
10.1	Ensure best practice is referred to and monitored through local permit systems throughout the term of the plan (cf. RPA 5.5).	Ongoing	High	Area managers/ conservators
10.2	Communicate changes in best practice, updates of key plans and documents supporting kiwi recovery, and availability of technical best practice workshops to relevant stakeholders.	Ongoing	High	KRG/ WBKG
10.3	Encourage the distribution of annual reports between western brown kiwi projects.	Annually	Medium	WBKG/Project managers
10.4	Foster communication between kiwi projects by maintaining the BNZSKT practitioner's website, national kiwi hui, regional fora and encouraging use of other suitable resources. [§]	Ongoing	High	KRG / National mentor for advocacy/ Project Managers/ WBKG
10.5	Hold a western brown kiwi hui in the intermediate years of the national kiwi hui, and continue bi-yearly if successful.	2011, and bi-yearly if successful	Medium	WBKG
10.6	Provide kiwi project information to national database(s) established by the Kiwi Recovery Group and others, when available.	Ongoing	Medium	Project Managers

[§] e.g. BNZSKT, Sanctuaries of New Zealand, Wildlife Management forum websites

5.2 Community

The strong association New Zealanders have with kiwi presents both opportunities and challenges. All over the country New Zealanders offer their time and money to help the conservation of kiwi, and their efforts have become integral in the security and recovery of western brown kiwi. Increasing community involvement and supporting those already active are vital aspects of conserving western brown kiwi. It is essential that encouragements and ongoing community support for kiwi conservation and research be provided.

5.2.1 Advocacy

Considerable resources for public awareness and advocacy for kiwi protection already exist. This is coordinated and led by the National Mentor for Kiwi Advocacy, who coordinates the development and dissemination of national and local advocacy material, and supports individual projects through visits, workshops and technical advice. A range of advocacy tools are used to reach a wide audience including regular media items on kiwi releases and community protection initiatives, face to face talks, interpretive displays, and publications. Some tools are targeted at very specific audiences such as avian aversion training for dog control, and information for the forestry industry on minimising logging impacts on kiwi. Local advocacy programmes include projects such as the Community Kiwi Protection Programme run by TKT (sponsored by TSB Community Trust), Kiwi Forever run by DOC (in partnership with Ngati Rangī, Untouched World Foundation, and BNZSKT) in Ohakune and inviting local schools to kiwi releases.

A general advocacy plan is provided in Appendix 2, as per Recovery Plan Action 18.3.

Issues

- National coordination of advocacy might not be able to serve specific local needs.
- Advocacy is not always considered as an integral part of recovery planning.
- Advocacy material is sometimes of poor quality or outdated, underutilising opportunities or even creating negative advocacy.
- Electronic media is a rapidly emerging form of communication not always well utilized by kiwi conservation projects.
- Most people can help to reduce threats to kiwi but may lack knowledge or interest to do so.

Objectives and Actions

OBJECTIVES	
11.1	Key advocacy messages for western brown kiwi are clear and effectively promoted across a wide range of audiences and demographics.
11.2	The web is effectively used as a fast and efficient tool to tell the stories of western brown kiwi and its management.
11.3	Local communities understand and are supportive of the management techniques being implemented within western brown kiwi programmes.
11.4	Sponsors and stakeholders are recognised and valued for supporting kiwi protection.

ACTIONS				
	Action	Timeframe	Priority	Accountability
11.1	If not already present, create local advocacy plans for all western brown kiwi projects.	By 2012	Medium	Area Managers/Project managers
11.2	Promote the key advocacy messages for western brown kiwi using a range of methods and tools in local advocacy plans.	Ongoing	Essential	All general and taxon specific kiwi advocacy programmes
11.3	Inform regional council staff and other agencies about kiwi to effectively increase advocacy for kiwi and their habitat through these agencies.	Ongoing	Medium	Area Managers/Project managers
11.4	Involve local communities in kiwi releases where appropriate.	Ongoing	High	Area Managers/Project Managers
11.5	Communicate success / threat stories in the media e.g. kiwi sanctuary findings, Maungatautari kiwi exports etc.	Ongoing	Medium	Area Managers/Project Managers
11.6	Liaise with local communities and residents to encourage compliance with dog control conditions.	Ongoing	Essential	Area Managers/Project Managers
11.7	Recommend and/or provide kiwi aversion training for dogs on properties adjacent to kiwi populations.	Ongoing	High	Area Managers/Project Managers

5.2.2 Tangata whenua

Tangata whenua have a repository of knowledge about kiwi, which is invaluable when protecting the species. Iwi also have statutory rights through the Treaty of Waitangi to have involvement in the management of kiwi. In many areas, iwi have embraced the kaupapa (principles) of kiwi recovery and kiwi habitat restoration, and are applying an active kaitiaki (guardian) role by carrying out predator control, building protection fences and implementing BNZ Operation Nest Egg.

Issues

- Involvement by tangata whenua in aspects of kiwi management is variable across western brown kiwi projects, with more opportunities present than have been utilised.
- The role of iwi in kiwi recovery planning and implementation and access to cultural materials is not always understood or given effect to.
- Kiwi translocations rely on meaningful consultation with tangata whenua.
- Tikanga varies between iwi, and this should be recognised in kiwi management practices.

Objectives and Actions

OBJECTIVES	
12.1	Iwi are involved at all levels of western brown kiwi management and research in an interactive way (cf. RPO 19.1).
12.2	Iwi understand and are supportive of the management techniques being implemented within western brown kiwi programmes.

ACTIONS				
	Action	Timeframe	Priority	Accountability
12.1	Identify opportunities and current barriers for involvement of tangata whenua in western brown kiwi recovery throughout the term of the plan (cf. RPA 19.2).	Ongoing	Essential	Area managers/ Conservators/WBKG
12.2	Ensure that agreed processes for involvement of tangata whenua in western brown kiwi management are observed throughout the term of the plan (cf. RPA 19.3).	Ongoing	Essential	Area managers/ Conservators
12.3	Ensure iwi-led conservation initiatives have access to technical support and best practice information.	Ongoing	High	Area Managers/ Conservators/ Kiwi Recovery Group

5.2.3 Community-led initiatives

Community-led initiatives are a vital part of western brown kiwi recovery. They have dramatically increased in number, and in the extent of land area and kiwi numbers managed, in recent years. They include private landowners, local interest groups, trusts, local authorities and businesses working independently or alongside DOC. With limited resources available to DOC, community initiatives are an integral part of the effort to conserve western brown kiwi.

Issues

- Community-led projects face a number of issues that endanger their long-term sustainability, including:
 - Working within a mainly annual grant structure and therefore a lessened ability for long-term planning.
 - Workload being carried mostly by volunteers, including aspects of strategic planning, funding and administration (e.g. translocation proposals) that are time-consuming, require a sustained effort and require specialist knowledge and skills.
 - Practitioners do not always have good access to the latest information pertaining to kiwi recovery, e.g. best practice, land management techniques, priority sites for kiwi protection.
- It is difficult for new groups to establish kiwi management in their area.

Objectives and Actions

OBJECTIVES	
13.1	To ensure that community involvement in western brown kiwi protection is optimised, sustained and follows best practice (cf. RPO 20.1).
13.2	A variety of community led projects across the range of western brown kiwi distribution is present and supported.
13.3	Individuals and organisations involved with the protection of western brown kiwi work co-operatively and share knowledge and best management practices.
13.4	Key stakeholders are valued and appreciated and their involvement continues to enhance knowledge of the taxon.

ACTIONS				
	Action	Timeframe	Priority	Accountability
13.1	Provide community groups with information on priority areas for management of western brown kiwi by 2011 and then throughout the term of the plan (cf. RPA 20.4).	2011, then ongoing	High	WBKG/BNZSKT/Conservators
13.2	Include community groups, where applicable, in the review and implementation of the western brown kiwi taxon plan throughout the term of the plan (cf. RPA 20.5).	May 2015 May 2020	Essential	Taxon plan lead conservators
13.3	Ensure existing and new community-led conservation initiatives have access to technical support and best practice information.	Ongoing	High	Area Managers/Conservators
13.4	Investigate opportunities for new community initiatives to be undertaken and promote these to local communities throughout the term of the plan.	By 2011 and ongoing	High	Area Managers/Conservators/WBKG
13.5	Maintain Taranaki kiwi forum as a regional support structure for local projects (complements RPA 18.2).	Minimum every two years	Essential	Taranaki kiwi projects/TRCI / National mentor for advocacy

5.2.4 Statutory planning

Western brown kiwi are often found in proximity to human occupation, and are increasingly at risk to threats such as dogs, cats and vehicles, especially as proposals for land development in and around kiwi habitat become more numerous. Learning from the experiences of Northland brown kiwi where human and kiwi interactions are more frequent provides opportunities to minimise some threats to kiwi through legislation, regulations, rules, incentives and policies.

Issues

- Predation of kiwi by domestic animals, in particular dogs and cats, is likely to increase with further land development and is difficult to manage outside public conservation land.
- Land development proposals are increasing within the western brown kiwi range.
- Priority areas for kiwi include linkages between larger areas of habitat, but this isn't always recognized.
- Councils are not always aware of kiwi distribution where land development is likely to be an issue.

- Information about kiwi presence and abundance at a site to evaluate likely risk is not available for all areas, and reduces our ability to make informed decisions about impacts on specific sites.

Objectives and Actions

OBJECTIVES	
14.1	Threats to western brown kiwi and their habitat are avoided, remedied or mitigated by promoting legislative and policy changes to statutory authorities (cf. RPO 22.1).
14.2	DOC is recognized and used as an integral part of the statutory process.

ACTIONS				
	Action	Timeframe	Priority	Accountability
14.1	Where practicable collate information on kiwi distribution and abundance for areas likely to be impacted by land development.	Ongoing	Medium	Area managers/ Programme managers
14.2	Provide local authorities with information on priority areas for management of western brown kiwi by 2011 and then throughout the term of the plan (cf. RPA 22.3).	2011, then ongoing	High	Area managers/ conservators/Planners
14.3	Encourage developers and landowners to register pet-free covenants against land titles near western brown kiwi populations, including existing residential uses and new subdivisions.	Ongoing	High	Area Managers/ Planners

5.2.5 Development of environmental standards

Western brown kiwi are known to use and successfully breed in plantation forest and farmland. Their presence, however, exposes them to activities associated with land management practices such as log harvesting, road development and land clearance. There are opportunities to improve kiwi protection through input into the environmental standards developing in the rural production sector. For instance, in 2008 the 'Forestry Management Guidelines for North Island brown kiwi' was produced as a collaborative effort between BNZSKT, DOC, Whakatane Kiwi Trust and Environment Bay of Plenty, which helps guide forestry activities to reduce their impact on kiwis.

Issues

- Not all forestry areas have information on kiwi presence and distribution and therefore do not undertake forestry activities according to the guidelines.
- Farmers are not always aware of the potential for kiwi to move across or inhabit their farms, and the impact (positive and negative) their activities could have.

Objectives and Actions

OBJECTIVES	
15	Opportunities for western brown kiwi protection on private production land through inclusion in appropriate environmental standards are optimized (cf. RPO 23.1).

ACTIONS				
	Action	Timeframe	Priority	Accountability
15.1	Provide information to certifying bodies for forestry, life-stock farming and horticulture regarding western brown kiwi biology and protection methods, and promote their consideration in the development of standards and certification criteria by 2011 and then throughout the term of the plan (cf. RPA 23.1).	2011, then ongoing	Medium	Area managers/ conservators/BNZSKT
15.2	Ensure that private production land owners and managers have access to technical advice and best practice guidelines for kiwi conservation.	Ongoing	High	Area managers
15.3	If available, lend out automatic kiwi call recorders to landowners to determine presence, distribution and relative abundance of kiwi on their land.	Ongoing	High	Area managers / Programme managers
15.4	Include in local advocacy plans production land owners as a target audience.	Ongoing	Medium	Project managers

5.3 Research

Kiwi recovery has benefited greatly through advances in tools and techniques, and continues to need good research support and communication. Current issues include affordability and scale of predator management, and monitoring and management of episodic impacts such as through dog and ferret attacks. Recently completed or ongoing research includes the genetic status of populations and kiwi taxa, captive kiwi diet, multi-set traps, smart transmitters, and new monitoring tools (see also Holzapfel *et al.* 2008 Appendix 1). This research is being carried out at a number of universities, within DOC, and through private enterprise.

More efficient and effective predator control is the most critical research required for western brown kiwi. Some current tools can be further refined for individual taxa. Western brown kiwi projects and practitioners can support further improvements through field support, and supply of data or samples, to individual research projects.

5.3.1 Genetics and taxonomy

The dominant genetic issue for western brown kiwi is to avoid or mitigate genetic bottlenecks, particularly in translocated (e.g. ONE) or small populations. Identification of the taxon of kiwi near taxon boundaries also awaits further clarification, although in areas where kiwi are very sparse it is unclear whether the resources required would be justified.

Issues

- The potential or actual effects of genetic bottlenecks on kiwi populations have not yet been quantified but may be significant.
- Kiwi taxonomy is not resolved, leading to uncertainties about the taxonomic status and the associated importance of distinct populations.

Objectives and Actions

OBJECTIVES	
16.1	To maximise the genetic diversity of western brown kiwi within the bounds of natural rates of genetic exchange and to ensure that new populations are established with the best possible composition of founders (cf. RPO 25.2).
16.2	The distribution of western brown kiwi around taxon boundaries is clarified.
16.3	The taxonomic status of Hauturu kiwi is clarified.

ACTIONS				
	Action	Timeframe	Priority	Accountability
16.1	Promote and support opportunities to undertake research of genetic diversity in ONE projects compared to their founder populations (i.e. Karioi Rahui and Waimarino, Aotuhia and Mount Taranaki).	As opportunity arises	Medium	Area Managers/ Project Managers
16.2	Confirm taxon identity of kiwi near taxon boundaries in the Ruahine/Rangitikei, Kaimai, and Kaimanawa areas.	By 2015	Medium	R&D/Technical Support/Project Managers
16.3	Clarify status of Hauturu kiwi to help determine their role in western brown kiwi recovery (RPA25.2).	By 2013	Medium	R&D/Technical Support/Project Managers

5.3.2 Autecology and population dynamics

Tongariro Forest Kiwi Sanctuary has undertaken research on chick survival pre- and post aerial 1080 operations, juvenile survival and dispersal, age-to-first-breeding, age of territoriality and adult survival (see Sutton *et al.* 2011). There is further information on breeding attempts and hatch rates of pairs, which all can be used to model the population and compare to projected outcomes. However, it is unclear how site specific this information is and to what degree it can be extrapolated out to other western brown kiwi populations.

Issues

- Some aspects of the results from Tongariro Forest may be site specific and require information from other populations to compare (i.e. impacts of ferrets on adult survival and differing survival rates of sub-adult sexes).
- Monitoring populations to determine population dynamics is labour intensive and expensive.
- Modeling of kiwi populations is a useful tool to determine status and trend, but hasn't been done for all populations under management

Objectives and Actions

OBJECTIVES	
17.1	Our understanding of the ecology and behaviour of western brown kiwi is increased (cf. RPO 26.2).
17.2	Develop population models for western brown kiwi and make them available to kiwi conservation projects.

ACTIONS				
	Action	Timeframe	Priority	Accountability
17.1	Facilitate basic and experimental research on western brown kiwi within kiwi conservation initiatives where appropriate.	Ongoing	High	Project Managers/ Area Managers
17.2	Undertake basic population modeling.	By 2012	Medium	Technical Support/ Project Managers
17.3	Complete western brown sub-adult survival, dispersal and age-at-first-breeding study within Tongariro Forest. Disseminate information to other kiwi practitioners.	By 2012	Essential	Sanctuary Programme Manager

5.3.3 Predator management

Specific research requirements for western brown kiwi include more efficient and effective predator control, continued investigation of the benefits of aerial 1080 for kiwi, the optimal long-term 1080 treatment regime for cost-effective kiwi protection, and better overlap in predator control benefits for kiwi with other threatened species protection (e.g. whio, kaka, kakariki). More cost-effective predator control can increase the total number of kiwi protected or help make protection sustainable.

Issues

- Most existing technologies for predator control to protect kiwi are labour intensive and require a sustained effort over a period of many years.
- Tools for dog control are limited or unproven.
- Kiwi would benefit from predator control which is easier for the community to get involved in.
- The impacts on native species and ecosystems of increased rat numbers resulting from predator control for kiwi need to be quantified, and mitigating measures developed if necessary.

Objectives and Actions

OBJECTIVES	
18.1	To improve the cost and labour-effectiveness of predator control management (RPO 27.1).
18.2	To reduce the impact of dogs on kiwi populations (RPO 27.2).
18.3	Improve western brown kiwi juvenile recruitment and adult survival by improving predator control techniques.
18.4	Improve overlap of benefits from kiwi protection to other threatened species.

ACTIONS				
	Action	Timeframe	Priority	Accountability
18.1	Support and/or lead the development of traps, bait, toxins and delivery systems for control of mustelids, rats, cats and dogs in western brown kiwi areas throughout the term of the plan (cf. RPA 27.1).	Ongoing	Essential	Project managers
18.2	Continue research on the use of large scale aerial 1080 for kiwi protection, including optimal treatment regime.	Ongoing	Essential	TFKS / Kia Wharite

5.3.4 Monitoring

Information on population trends and absolute kiwi numbers is costly to collect and labour intensive. Improved methods allowing cheaper and more accurate assessments, over broader geographic areas, would benefit western brown kiwi projects and allow more resources used in kiwi recovery to go directly into management costs.

Issues

- Population trend monitoring requires a long-term commitment of effort that is difficult to maintain with short-term funding cycles.
- Tools for broad population trend monitoring are unsuitable for low-density (e.g. widely dispersed) populations.
- Detailed population monitoring is cost- and labour-intensive.

Objectives and Actions

OBJECTIVES	
19.1	Sufficient and robust information is available to assess the status and trends of western brown kiwi and key populations (cf. RPO 28.1).
19.2	Accurate monitoring techniques for western brown kiwi management regimes are developed, including indices or measures of kiwi density in key wild populations.

ACTIONS				
	Action	Timeframe	Priority	Accountability
19.1	Continue kiwi monitoring in Tautea Kia Wharite, Purangi/Matau/Pouiatua, Tongariro Forest, Waimarino Forest, Maungatautari Ecological Island, and Egmont National Park with kiwi call surveys at least 5 yearly or as recommended by the Kiwi Recovery Group.	5 yearly	High	Project Managers
19.2	Develop population models for all sites under management to determine the likely growth rate of populations.	By 2012	High	Technical support
19.3	Support/lead research on the use of automatic kiwi recorders to determine trend and status of populations.	Until 2012	High	Project Managers

6 Acknowledgements

We thank the many community groups, iwi, landowners, DOC staff, and other agencies' staff who contributed to development and writing this plan for their time and enthusiasm.

This plan was based on a technical report by John McLennan and an earlier draft management plan prepared by Peter Morton, and was further improved by comments from the members and associates of the Kiwi Recovery Group.

7 References

- Baker, A.J.; Daugherty, C.H.; Colbourne, R.; McLennan, J.A. 1995. Flightless brown kiwis of New Zealand possess extremely subdivided population structure and cryptic species like small mammals. *Proceedings of the National Academy of Science, USA* 92: 8254-8258.
- Barlow, S. 2011. Captive Management Plan for Kiwi - Final 2010-2015. Zoo Aquarium Association, Auckland.
- Bull, P.C.; Gaze, P.D.; Robertson, C.J.R. 1985. The Atlas of Bird Distribution in New Zealand. The Ornithological Society of New Zealand Inc., Wellington, New Zealand.
- Buller, W. L. 1877. Further notes on the ornithology of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 10: 201-209.
- Burbidge, M.L.; Colbourne, R.M.; Robertson, H.A.; Baker, A.J. 2003: Molecular and other biological evidence supports recognition of at least three species of brown kiwi. *Conservation Genetics* 4: 167-177.
- Butler, D.; McLennan, J.A. 1991: Kiwi Recovery Plan. Threatened Species Recovery Plan 2. Department of Conservation, Wellington.
- Campbell, J.; Dijkgraaf, A. 2001. Kiwi call survey in the Waitotara Conservation Area/Whanganui National Park. April, 2001. Unpublished Department of Conservation Monitoring Report, Whanganui Conservancy.
- Colbourne, R. 2005: Kiwi (*Apteryx* spp.) on offshore New Zealand islands: populations, translocations and identification of potential release sites. *DOC Research & Development Series* 208. Department of Conservation, Wellington.
- Cowan, J. 1939: A Tapu Isle of Birds - Hauturu And Its Inhabitants, Old Maori Memories. *The New Zealand Railways Magazine* 13 (10):17-19, 21, 44.
- Craig, E.; Gardiner, C.; Renwick, N.; Sporle, W. in prep. Taxon plan for Northland brown kiwi (*Apteryx mantelli*). Unpublished draft, Department of Conservation, Whangarei.
- De Monchy, P.; Robertson, H.; Holzapfel, S.; Colbourne, R.; Hackwell, K. 2009. A review of DOC's kiwi sanctuaries, and a plan for 2009-2014. Unpublished report. Department of Conservation. Wellington.
- Department of Conservation 2007a: Taxon management plan for western North Island brown kiwi (*Apteryx mantelli*); draft management & consultation plan 2007 - 2017. Unpublished draft, Department of Conservation, Whanganui.
- Department of Conservation 2007b: Inter-conservancy agreement on the ecological principles to be applied for the management of Western north island brown kiwi. Unpublished memorandum of understanding, Department of Conservation, Whanganui/Waikato/Tongariro-Taupo Conservancies.
- Department of Conservation 2008: Outline of the Department's direction and approach; prepared for the strategy and budget alignment review team, 18th February 2008. Unpublished draft, Department of Conservation, Wellington.
- Department of Conservation; Ministry for the Environment 2000: The New Zealand Biodiversity Strategy: our chance to turn the tide. Department of Conservation and Ministry for the Environment, Wellington.
- Heather, B.D.; Robertson, H.A. 2005: The Field Guide to the Birds of New Zealand. Penguin, Auckland.
- Hitchmough, R.A.; Bull, L.; Cromarty, P. 2007: New Zealand Threat Classification System lists 2005. Department of Conservation, Wellington.

- Holzzapfel, S.A.; Robertson, H.A., McLennan, J.A.; Sporle, W.; Hackwell, K.; Impey, M. 2008: Kiwi (*Apteryx* spp.) recovery plan: 2008-2018. *Threatened Species Recovery Plan 60*. Department of Conservation, Wellington.
- Hood, R. Sutton, N.; Guillotel, J.; Dix, A.; Beath, A.; Raemakers, T.; Lawson, T. 2010. Tongariro Forest Kiwi Sanctuary Annual Report 2009-10. Unpublished report. Department of Conservation, Whakapapa.
- Johnson, T. (comp) 1996: Husbandry manual for North Island brown kiwi *Apteryx australis mantelli*, version May 1996. Unpublished typescript, held by Information Resource Centre, Department of Conservation, Wellington.
- McLennan, J.A 2006: Western North Island brown kiwi (*Apteryx mantelli*): pathways to conservation and recovery. Department of Conservation Technical Report.
- McLennan, J.A.; Dew, L.; Miles, J.; Gillingham, N.; Waiwai, R. 2004: Size matters: predation risk and juvenile growth in North Island brown kiwi (*Apteryx mantelli*). *New Zealand Journal of Ecology* 28: 241-250.
- Miles, J.; Potter, M.A.; Fordham, R.A. 1997. Northern Brown Kiwi in Tongariro National Park and Tongariro Forest - ecology and threats. *Science for Conservation* 51. Department of Conservation, Wellington.
- Miskelly, C.M.; Dowding, J.E.; Elliott, G.P.; Hitchmough, R.A.; Powlesland, R.G.; Robertson, H.A.; Sagar, P.M.; Scofield, R.P.; Taylor, G.A. 2008: Conservation status of New Zealand birds, 2008. *Notornis* 55:117-135.
- Peet, N. 2003. Egmont National Park Kiwi Conservation Plan 2003-2008. Unpublished report, Department of Conservation, Stratford.
- Robertson, H.A.; Colbourne, R.M. 2003: Kiwi (*Apteryx* spp.) best practice manual. Internal report (QD code 1428). Department of Conservation, Wellington (unpublished).
- Robertson, H.A.; Colbourne, R.M.; Graham, P.J.; Miller, P.J.; Pierce, R.J. 2011. Experimental management of brown kiwi *Apteryx mantelli* in central Northland, New Zealand. *Bird Conservation International* 21; 207-220.
- Robertson, C.J.R.; Hyvönen, P.; Fraser, M.J.; Pichard, C.R. 2007. Atlas of Bird Distribution in New Zealand 1999-2004. The Ornithological Society of New Zealand Inc., Wellington, New Zealand.
- Sutton, N.; Guillotel, J.; Potae, R. 2011. Tongariro Forest Kiwi Sanctuary Annual Report 2010-11. Unpublished report. Department of Conservation, Whakapapa.
- Sutton, N.; Hood, R.; Guillotel, J.; Fawcett, M.; Kivi, S.; Beath, A.; Dix, A.; Clancy, M.; Mills, S. 2008: Tongariro Forest Kiwi Sanctuary Annual Report (July 2007 - June 2008). Department of Conservation, Tongariro-Taupo (unpublished).
- Townsend, A.J.; de Lange, P.J.; Duffy, C.A.J.; Miskelly, C.M.; Molloy, J.; Norton, D. 2008: New Zealand Threat Classification System Manual. Department of Conservation, Wellington.

8 Appendices

Appendix 1: Actions for recovery

Timeline and priorities for recovery actions for western brown kiwi *Apteryx mantelli*.

Priorities:

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



ACTION	PRIORITY	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1.1 Develop a western brown kiwi group (WBKG).	Essential	✓	✓									
1.2 WBKG meet after every second breeding season, or more frequently when required. Review taxon plan at this time.	Medium		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1.3 Consult and involve the Kiwi Recovery Group in strategic and management decision making.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.1 Protect around 1500 kiwi pairs [†] at Tautea Kia Wharite with broadscale aerial 1080.	Essential											
2.2 Protect large population of around 350 kiwi pairs [†] at Purangi/Matau/Pouiatoa (Taranaki) by controlling relevant predators.	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.3 Protect around 100 kiwi pairs [†] in the Tongariro Forest Kiwi Sanctuary through broadscale aerial 1080.	High		✓				✓				✓	✓
2.4 Protect around 60-70 kiwi pairs [†] on Mt Taranaki by controlling relevant predators and supplementing the population with ONE.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.5 Explore options for fully protecting the population of 20-30 pairs of kiwi at Rangataua Conservation Area.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2.6 Explore options for implementing predator control at Waimarino Forest to protect approximately 100 pairs of kiwi.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3.1 Provide advice and support to new programmes, particularly for initiatives which will secure a large population of kiwi.	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3.2 Investigate feasibility of predator control at sites with populations between 50-200 pairs where management does not currently occur.	High	✓	✓									
3.3 Determine distribution and relative abundance of remnant kiwi populations in unmanaged areas.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3.4 Create a centralized database of distribution data collated from past work, and add future survey data.	Medium	✓	✓									
4.2 Robustly monitor kiwi chick survival and mustelid tracking rates pre- and post-1080 operation at Tongariro Forest	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4.3 Monitor sub-adult survival, dispersal and territory/breeding age.	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4.4 Communicate key findings of 1080 experiment to stakeholders and community.	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4.5 Review the focus of the Tongariro Forest Kiwi Sanctuary after the completion of the 1080 experiment.	Essential			✓								

ACTION	PRIORITY	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
4.6	Use the kiwi sanctuary network for dialogue, information and staff exchange.	Medium	✓	✓	✓	✓	✓					
5.1	Enhance existing projects to increase local population abundance to the point where the population can be used as kohanga kiwi	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5.2	Establish a founder population of at least 40 kiwi (not closely related) into Maungatautari. Eventually act as a kohanga kiwi.	Essential	✓	✓	✓	✓	✓					
5.3	Investigate the potential for new kohanga kiwi sites within western brown kiwi range.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6.1	Forecast demand for ONE and crèche facilities and discuss with institutions annually prior to breeding season.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6.2	Use transparent and objective criteria (s5.1) on recovery priorities to determine how limited space or resources are allocated.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6.3	Identify in management plans how genetic issues will be managed during ONE to maintain population health.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6.4	Review ONE projects to determine the contribution made to a population from ONE breeding pairs. Replace pairs that are over represented within the population.	High	✓	✓								
6.5	Evaluate impact of ONE on the source population and return a proportion of juveniles if deemed appropriate.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6.6	Ensure crèche facilities with predator proof fences have adequate predator incursion response and monitoring plans in place.	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6.7	Support initiatives to develop new crèche sites (e.g. Wairakei, Rotokare) if demand for new sites are present.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7.1	Clarify existing agreements regarding release of captive kiwi offspring and any ongoing commitments.	High	✓									
7.2	Phase out all western brown kiwi from captivity unless held for rehabilitation	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8.1	Manage western brown kiwi as a separate conservation management unit to other taxa	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8.2	Minimise translocations between geographic extremes and natural boundaries throughout the term of the plan (RPA 13.4).	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8.3	Identify in management plans and translocation proposals how genetic issues will be managed to maintain population health.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8.4	Carry out translocations into managed kiwi populations if required to maintain genetic diversity, with approval from KRG	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



ACTION	PRIORITY	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
9.1 16.3 Clarify genetic status of Hauturu kiwi to help determine their role in western brown kiwi recovery (RPA25.2).	Medium	✓	✓	✓	✓							
9.2 Maintain the predator free status of Hauturu to secure the population present on the island.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9.3 Maintain predator control over 1000 ha or more at Rimutaka Forest Park.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9.4 Maintain the predator control over c. 1000 ha at Pukaha Mount Bruce.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9.5 Undertake ONE where appropriate to supplement mixed provenance populations at Rimutaka and Pukaha Mount Bruce	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9.6 Manage populations at Rimutaka and Mount Bruce as part of the mixed-provenance zone between the western and eastern brown kiwi taxa.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9.7 Designate zones and avoid creating new mixed provenance kiwi populations outside designated zones.	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9.8 16.2 Confirm distribution and taxon of kiwi near taxon boundaries in the Ruahine/Rangitikei, Kaimai, and Kaimanawa areas.	Medium	✓	✓	✓	✓	✓	✓					
10.1 Ensure best practice is referred to and monitored through local permit systems throughout the term of the plan (RPA 5.5).	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10.2 Communicate changes in best practice, updates of key plans and documents, and availability of workshops to stakeholders.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10.3 Encourage the distribution of annual reports to other western brown kiwi projects.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10.4 Foster communication between kiwi projects.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10.5 Trial a western brown kiwi hui in the intermediate years of the national kiwi hui.	Medium			✓				✓				✓
10.6 Provide kiwi project information to national database(s) established by the Kiwi Recovery Group, when available.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11.1 If not already present, create local advocacy plans for all western brown kiwi projects.	Medium	✓	✓	✓								
11.2 Promote the key advocacy messages for western brown kiwi in local advocacy plans (Appendix 2).	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11.3 Inform regional council staff and other agencies about kiwi to effectively increase advocacy through these agencies.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11.4 Involve where appropriate local communities in kiwi releases.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

ACTION	PRIORITY	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
11.5 Communicate our success/threats stories in the media e.g. kiwi sanctuary findings, Maungatautari kiwi exports etc.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11.6 Liaise with local communities and residents to encourage compliance with dog control conditions.	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11.7 Recommend and/or provide kiwi aversion training for dogs on properties adjacent to kiwi populations.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12.1 Identify opportunities and current barriers for involvement of tangata whenua in kiwi recovery (RPA 19.2).	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12.2 Ensure that agreed processes for involvement of tangata whenua in kiwi management are observed (RPA 19.3).	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
12.3 Ensure iwi-led conservation initiatives have access to technical support and best practice information.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
13.1 Provide community groups with information on priority areas for management of kiwi (RPA 20.4).	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
13.2 Include community groups, where applicable, in the review and implementation of taxon plans (RPA 20.5).	Essential						✓					✓
13.3 Ensure existing community-led initiatives have and provide new initiatives with access to technical support and best practice information.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
13.4 Investigate opportunities for new community initiatives to be undertaken.	High	✓	✓									
13.5 Maintain Taranaki kiwi forum as a regional support structure for local projects (complements RPA 18.2).	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
14.1 Where practicable collate information on kiwi distribution and abundance for areas likely to be impacted by land development.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
14.2 Provide local authorities with information on priority areas for management of kiwi by 2011 (RPA 22.3).	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
14.3 Strongly encourage developers and landowners to register pet-free covenants against land titles near kiwi populations.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15.1 Promote the consideration of kiwi in the development of standards and certification criteria (RPA 23.1).	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15.2 Ensure that private production land owners have access to technical advice for kiwi conservation.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



ACTION	PRIORITY	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
15.3 If available, lend out kiwi call recorders to landowners to determine presence of kiwi on their land.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
15.4 Include in local advocacy plans production land owners as a target audience.	Medium	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16.1 Promote and support research of genetic diversity in ONE projects compared to their founder populations.	Medium	✓	✓	✓	✓	✓	✓					
17.1 Facilitate basic and experimental research on western brown kiwi within kiwi conservation initiatives where appropriate.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
17.2 Develop population models for all sites under management to determine the likely growth rate of populations.	High	✓	✓	✓								
18.1 Support and/or lead the development of traps, bait, toxins and delivery systems for control of predators in kiwi areas (RPA 27.1)	Essential	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
19.1 Conduct baseline kiwi call surveys, then monitor kiwi numbers at least 5 yearly in managed populations.	High	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
19.3 Support/lead research on the use of automatic kiwi recorders to determine trend and status of populations.	High	✓	✓	✓								

Appendix 2: Western brown kiwi advocacy plan

1. Key messages

Key advocacy messages for western brown kiwi have been developed to be consistent with the Kiwi Recovery Plan and this taxon plan. These messages will be reviewed every 5 years as part of the taxon plan review. As at publication the key messages are:

- Kiwi are unique birds unlike any other, and are threatened with extinction if no action is taken.
- The best way to protect kiwi is by controlling the predators and domestic animals that threaten them. Most people can assist in some way with this work.
- Managed kiwi populations are stable or increasing, but kiwi populations are still in decline in unmanaged areas.
- Controlling predators to protect kiwi protects other native species as well.
- Kiwi are an indicator of the health of many other species in a forest.
- Kiwi must coexist with other plant and animal species in a healthy ecosystem to thrive and persist.
- Large scale predator control is needed to conserve kiwi. Widespread aerial 1080 can be used more effectively to improve survival of young kiwi, and can be relatively affordable. Extensive ground-based poisoning and trapping campaigns can also be effective.
- Securing funding is the key issue for securing western brown kiwi in the long term. The places and techniques to do so are already available.
- The loss of one breeding adult equates to the loss of ten chicks.
- The support of neighbouring land owners and conservation land users is essential for kiwi protection. They help to control threats, reduce infrastructure damage, and promote kiwi conservation through their understanding of and support for management techniques used to protect western brown kiwi.
- Community groups and organisations are working to protect kiwi. They deserve recognition and sustained support for their work and they are crucial to the long term success of kiwi management.
- The Bank of New Zealand Save the Kiwi Trust is supporting the protection of kiwi.

2. Methods

As a prominent national icon, kiwi are commonly used in advocacy programmes for conservation, and considerable resources for public awareness and advocacy for kiwi protection in general already exist. However, these programmes are often only effective with people that are already interested in conservation and require the audience to be present at kiwi activities or be searching for kiwi information (e.g. kiwi houses, websites, interpretive signs along nature walks). In addition, advocacy programmes don't always use methods effective in reaching a wide range of audiences. We need to develop means of reaching out to those sectors of the community with which we have the greatest difficulty communicating with, such as recreation groups like hunters and 4WD groups. We also need to effectively use electronic media to share information to a younger generation, and find a way to bring the information to the audience. The following are methods (both internally and externally) to share the key messages to a wide range of audiences:

Focus	Explanation
Other effective advocates	Work with other agencies and networks (such as regional council, forestry etc.) to inform them about kiwi and how they and landowners and land users can help conserve kiwi. These agencies can be effective kiwi advocates too.
Avian aversion training and promotion	Advocate for avian aversion of both domestic and working dogs, both a serious threat to kiwi. This is also an opportunity to share information about kiwi and other conservation messages to hunters and landowners.
School and community education programmes	School programmes have the ability to set young people on a path which encourages them to take a greater interest in kiwi and conservation. The adults who come into contact with the education programmes also take from them a new perspective of the nature of species protection. Seek opportunities to give interactive talks to schools and community about kiwi and conservation. Inform teachers about teaching resources available on BNZ Save the Kiwi website, and develop activities at a local level (e.g. kiwi releases) to invite schools to.
Captive institution advocacy programmes (including crèches)	These facilities provide for some the only chance to see a live kiwi, and their local advocacy programmes using visual and auditory media reaches thousands. Continuation of these programmes is a key advocacy tool.
Media releases	Seek opportunities to ‘sell our success stories’ in the media, raising awareness of what kiwi conservation has accomplished, and alternatively about human induced impacts such as dogs and kiwi killed by cars. The media is effective in reaching audiences not otherwise reached through more conventional methods.
Volunteers	User generated content is often viewed as more credible than the ‘official’ side of the story, and we can make the most of it to support what we do. By involving volunteers in kiwi projects, and using their stories can make kiwi work ‘real’ to some.
Social media networking and other electronic media	The potential to reach a younger audience through new media such as Facebook, Youtube, podcasts and I-phone applications is a developing opportunity not currently well used. The success of Sirocco as a celebrity for kakapo using Facebook and Youtube clips to increase his fame (and hence his message) could be repeated with kiwi.

Websites	The BNZ Save the Kiwi Trust website has a lot of information and many useful links, and the DOC website can provide information on local projects. Most community projects have their own websites depicting the work they do. These need to be kept up to date to provide the most relevant information to those who are seeking it.
Field days and other public displays	Field days (e.g., Sika show) are opportunities for kiwi conservation to be taken to the audience, and can reach sectors of the community not usually reached by other means.
Kiwi practitioners	During the day-to-day work undertaken by kiwi practitioners, there are often encounters with the public. All field workers are in effect community relations staff, and the simple conversation to be had on those occasions is sometimes the most effective advocacy tool. Therefore staff need to engage with the community at every opportunity presented to them.

