



THREATENED SPECIES RECOVERY PLAN 64

Kiwi Recovery Plan 2018–2028

Mahere Whakaora Kiwi 2018–2028

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Cover: Young brown kiwi (*Apteryx mantelli*) chick, Whakatāne Kiwi Trust, Ohope. *Photo: Neil Hutton.*

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Foreword

The Director, Terrestrial Ecosystems of the Department of Conservation (DOC) formally approved this threatened species recovery plan on 5 November 2018.

Threatened species recovery plans provide high-level recovery goals and objectives that drive recovery programmes and identify the priority actions needed to advance species recovery towards those goals.

- The Kiwi Recovery Plan 2018–2028 provides direction to the kiwi recovery programme by setting goals and objectives that will secure kiwi from extinction and advance their recovery,
- Is proactive, focuses on significant kiwi recovery issues, and identifies measurable recovery actions needed to achieve the plans goals and objectives.
- Identifies the priority recovery actions to be implemented by DOC, iwi, partners and stakeholders,
- Provides a basis from which DOC operational staff can develop annual operational work plans that integrate kiwi recovery,
- Provides a framework to reach recovery goals through collaboration between government, tangata whenua, community groups, captive institutions, councils, non-profit organisations, landowners, researchers and members of the public, and
- Stimulates the development of best-practice techniques and documents that help guide implementation of recovery actions.

The Kiwi Recovery Group* led the preparation of this plan with engagement from people interested in kiwi recovery or affected by this plan, including tangata whenua, kiwi experts, conservation practitioners and managers from DOC and the community, captive institutions, councils, non-profit organisations and others. Over fifty contributors have helped form the plan. Drafts were sent to relevant DOC Operations Districts, Managers and Directors for comment and to people and organisations with an interest in kiwi conservation. The recovery planning process included opportunities for further consultation between DOC and tangata whenua and the draft was subject to technical reviews internally within DOC and externally. Changes to the plan were made as a result of this consultation and the technical reviews.

The Kiwi Recovery Group will review progress to implement this plan and recommend to managers and practitioners changes that may be required in the delivery of kiwi recovery. Those interested in being more involved in kiwi recovery or in receiving information should direct queries to the Kiwi Recovery Group via any DOC office or to the Manager, Central Terrestrial Ecosystems Team (PO Box 10420, Wellington 6143).

A review of the plan is due in 2022, or sooner if new information or technology leads to a significant change in the direction of kiwi recovery or the goals of this plan are met sooner than anticipated. The review may result in the revision of the plan or the development of a new plan. This plan will remain operative until a new plan has been approved.

* The role of the Kiwi Recovery Group is to provide high-quality strategic and technical advice that sets the direction for kiwi recovery and supports implementation of recovery actions.

Kupu whakataki

Nā te Kaihautū, Pūnaha Taiāo, Kāhui Kanorau Koiroa o Te Papa Atawhai (DOC) tēnei mahere whakaora momo mōrearea i whakamana ā-kawa i te 5 Whiringa-ā-rangi 2018.

Kei te whakarato ngā mahere whakaora momo mōrearea i ngā whāinga me ngā tūmanako whakaora pae-teitei hei kōkiri i ngā hōtaka whakaora, hei tohu hoki i ngā mahi matua me tutuki hei whakaahu whakamua i te whakaoranga momo ki aua whāinga.

- Ko te Mahere Whakaora Kiwi 2018–2028 kei te whakarato aronga ki te hōtaka whakaora kiwi mā te whakatakoto whāinga, tūmanako anō hoki hei pupuru i te kiwi mai i te korehāhā me te whakaahu whakamua i tōna whakaoranga,
- He whakaneinei, ā kei te aro ki ngā take whakaora kiwi hira, me te tohu i ngā mahi whakaora ka taea te ine me mātua whakamahi hei whakatutuki i ngā whāinga me ngā tūmanako o te mahere,
- Kei te tohu i ngā mahi whakaora matua hei whakatinanatanga mā Te Papa Atawhai, mā ngā iwi, mā ngā hoa rangapū, mā ngā hunga whaipānga anō hoki,
- Kei te whakarato i tētahi pūtaka mā ngā kaimahi ā-ringa o Te Papa Atawhai hei whakawhanake i ngā mahere mahi ā-tau e whakauru ana ai i te whakaoranga kiwi,
- Kei te whakarato i tētahi pou tarāwaho kia tutuki ai ngā whāinga whakaora mā te mahi ngātahi a te kāwanatanga rātou ko ngā tangata whenua, ko ngā rōpū hapori, ko ngā whakahaere rarau, ko ngā kaunihera, ko ngā whakahaere kore huamoni, ko ngā kaupupuri whenua, ko ngā mema o te hunga tūmatanui anō hoki, me
- Kei te whakamanawa i te whakawhanaketanga o ngā tino tikanga me ngā pukapuka hei tautoko i te arataki mō te whakaritenga o ngā mahi whakaora.

He mea ārahi e te Rōpū Whakaora Kiwi (Kiwi Recovery Group)* te whakaritenga o tēnei mahere me te tūhonotanga o ngā tāngata e kaingākau ana ki te whakaoranga kiwi, e pāngia ana rānei e tēnei mahere, tae atu ki ngā tangata whenua, ngā pūkenga kiwi, ngā kaimahi tiaki taiao me ngā kaiwhakahaere mai i Te Papa Atawhai, te hapori, ngā whakahaere rarau, ngā kaunihera, ngā whakahaere kore huamoni, a wai atu, a wai atu. Neke atu i te rima tekau ngā kaiāwhina kua tautoko hei hanga i te mahere. I tukuna ngā tuhinga hukihuki ki ā Te Papa Atawhai Rohe ā-Mahi, Kaiwhakahaere, Kaitohu hoki e hāngai ana hei tuku kōrero mai, ki ngā tāngata me ngā whakahaere e whai pānga ana ki te tiakitanga kiwi hoki. I whai wāhi ki te hātepe whakamahere whakaoranga ētahi kōwhiringa mō te uiuinga i waenganui i Te Papa Atawhai rātou ko ngā tangata whenua, ā i tukuna hoki te tuhinga hukihuki ki ētahi arotakenga hangarau ki roto tonu i Te Papa Atawhai, ki waho anō hoki. Hei hua o taua uiuinga me ngā arotakenga hangarau i panonihia ētahi āhuatanga o te mahere.

Ka arotake te Rōpū Whakaora Kiwi i te haere whakamua kia whakatinanatia tēnei mahere me te tūtohu ki ngā kaiwhakahaere, ki ngā kaimahi ā-ringa hoki ngā panoni ka hiahia pea ki ngā mahi whakaora kiwi. Ko te hunga e kaingākau ana kia kaha ake te whai wāhi mai ki te whakaoranga o te kiwi, te whiwhi rānei ki ētahi pārongo me tuku i ngā pātai ki te Rōpū Whakaora Kiwi (Kiwi Recovery Group) ki tētahi tari o Te Papa Atawhai, ki te Kaiwhakahaere/Manager, Central Terrestrial Ecosystems Team (PO Box 10420, Wellington 6143).

Me arotake te mahere hei te tau 2022, i mua rānei i taua tau mēnā ka tohua e te mōhihio hou, te hangarau hou rānei tētahi panoni hira i te aronga o te whakaoranga kiwi, mēnā rānei ka whakatutukihia ngā whāinga o tēnei mahere i mua i te wā kua tohua. Mā taua arotakenga e hua mai pea te whakahounga o te mahere, te whakawhanaketanga rānei o tētahi mahere hou. Ka whai mana tonu tēnei mahere tae noa atu ki te whakaaetanga o tētahi mahere hou.

* Ko te mahi a te Rōpū Whakaora Kiwi ko te tuku i te kupu āwhina papai ā-rautaki, ā-hangarau hoki hei whakatakoto i te aronga o te whakaoranga kiwi, hei tautoko i te whakatinanatanga o ngā mahi whakaora.

Kiwi Recovery Plan 2018–2028

Jennifer Germano¹, Suzy Barlow², Isabel Castro³, Rogan Colbourne⁴, Morgan Cox⁵, Craig Gillies⁶, Kevin Hackwell⁷, Joe Harawira⁴, Michelle Impey⁵, Arapata Reuben⁸, Hugh Robertson⁴, Jess Scrimgeour⁴, Wendy Sporle⁵ and Sandy Yong⁹

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Abstract

Over the past 25 years, there have been significant successes in kiwi (*Apteryx* spp.) conservation, particularly in preventing the extinction of the most critically endangered kiwi species. However, the majority of kiwi (over 70%) remain in unmanaged populations and therefore, nationally, kiwi continue to decline. The knowledge and tools now exist to turn this decrease into an increase. Where they are managed, kiwi populations are growing at rates of 2% per annum or higher. The next 10 years will see kiwi conservation enter a new phase of growth for all kiwi species across the country. In the past, the recovery of some kiwi species was reliant on *ex situ* (captive) management techniques and was focused on the rarest kiwi. To reach the scale necessary to increase all kiwi species, however, requires an increase in the use and extent of *in situ* management of kiwi in the wild. This is particularly true for South Island species and will continue in the North Island. The long-term goal of this fourth Kiwi Recovery Plan 2018–2028 is: **To reach 100 000 kiwi by 2030 by growing all kiwi species by at least 2% per year, restoring their former distribution and maintaining their genetic diversity.** This plan has 15 goals covering management, engaging people, research and sustainability. An implementation section sets out issues, objectives and actions to reach these goals. Appendices outline for all actions a timeline, relevant kiwi species and how they link to the Department of Conservation’s wider goals. This plan will be reviewed in 5 years in 2023.

Keywords: kiwi, *Apteryx*, landscape-scale predator control, threatened species recovery, tangata whenua, kaitiaki, community, genetic management, threat of dogs, predation

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Mahere Whakaora Kiwi 2018–2028

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Tuhinga whakarāpopoto

Nō roto i te 25 tau kua pahure ake, kua hua mai ētahi angitū hira i te tiakitanga kiwi (ngā tini momo *Apteryx*), inarā te ārai i te korehāhā o ngā momo kiwi mōrearea taumaha rawa. Heoi anō, kei te noho kore mahi whakahaere tonu te nuinga o ngā kiwi (neke ake i te 70%) nō reira kei te heke haere ā-motu tonu te kiwi. Kei konei ināianei te mātauranga, me ngā taputapu hei hurikōaro i taua hekenga iho ki te pikinga ake. Kei ngā wāhi whakahaere, kei te tipu ngā kiwi mā te 2% ia tau neke atu rānei. Hei roto i te 10 tau kei te heke mai ka kuhu atu te tiakitanga kiwi ki tētahi wā hou mō te tipu haere o ngā momo kiwi katoa puta noa i te motu. I ngā wā o mua, i whirinaki te whakaoranga o ētahi momo kiwi ki ngā tikanga whakahaere (rarau) ki wāhi kē, ā i aro atu taua mahi ki ngā kiwi ongeonge rawa. Heoi anō, kia eke atu ki te whānuitanga e piki ai te katoa o ngā momo kiwi, me mātua whakarahi, whakawhānui hoki te whakamahi i ngā tikanga whakahaere kiwi ki te wao. E hāngai pū ana tēnei ki ngā momo o Te Wai Pounamu, ā ka hono tonu atu ki Te Ika a Māui. Ko te whāinga pae tawhiti o tēnei te tuawhā o ngā Mahere Whakaora Kiwi 2018–2028 ko: **Te tae atu kia 100 000 ngā kiwi hei te tau 2030 mā te whakatipu i ngā momo kiwi katoa mā te 2% ia tau neke atu rānei, te haumanu i te nuku o ō rātou nōhanga o mua, me te pupuru i ō rātou rerenga ā-ira.** E 15 ngā whāinga o tēnei mahere e pā ana ki te whakahaere, te tūhono i te tangata, te rangahau me te whakauka. Kei te whakatakotoria ki tētahi wāhanga whakatinanatanga ngā take, ngā tūmanako me ngā mahi kia tae rawa atu ki aua whāinga. Mō tēnā, mō tēnā o ngā mahi kei te whakaaturia e ngā āpitihanga tētahi wātaka, ngā momo kiwi whaitake, me te hononga o aua mahi ki ngā whāinga whānui o Te Papa Atawhai. Ka arotakengia tēnei mahere hei te 5 tau, hei 2023.

Ngā kupu matua: kiwi, *Apteryx*, tāmi konihi ki ngā wāhi rahi, tangata whenua, kaitiaki, hapori, whakahaere ira, whakatuma o te kurī, mate konihi

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1. Introduction

In both scale and breadth, kiwi (*Apteryx* spp.) recovery is one of the most complex and successful conservation partnerships in Aotearoa/New Zealand. The goal of increasing the numbers of kiwi in Aotearoa stretches far beyond the mandate and ability of any one agency or group. Work stretches from the top of Northland/Te Tai Tokerau to Stewart Island/Rakiura in the south – with active participation of hundreds of partners ranging from the Department of Conservation (DOC) and tangata whenua to community groups and captive facilities, philanthropists, private landowners and researchers.

The Kiwi Recovery Plan is the overarching document providing strategic direction for recovery of all kiwi species. Its development has promoted discussion amongst numerous groups, agencies and experts on the current state of kiwi populations and the best ways to grow them. It helps guide the work and allocate resources for DOC, Kiwis for kiwi and many other groups and people involved in kiwi recovery. Furthermore, the Plan will continue to encourage a collaborative effort, focusing on goals, objectives and actions that would be unachievable for any one group on its own.

2. Plan details

2.1 Term and review date

Term of the plan: 10 years from 2018 to 2028

Review date: 2023

2.2 Development process

Kiwi recovery presently involves DOC and well over a hundred Treaty Partners, other partners and active stakeholders. It was necessary that this updated recovery plan be written in a way that was relevant and accessible to this diverse audience. To be inclusive and make use of the required and widely-spread expertise, broad engagement was led by the Kiwi Recovery Group. This allowed the incorporation of expertise from over 50 kiwi biologists, on-the-ground kiwi recovery practitioners, tangata whenua, DOC staff, community leaders, academics, managers and operators of captive facilities to contribute their expertise to the plan.

Tangata whenua advisors were included as part of the authorship team. A whānau/hapū/iwi working group was established and periodically reviewed the draft plan during its development. Feedback was sought at the 2016 Whānau, Hapū and Iwi in Conservation Hui at Tūteao Marae in the Bay of Plenty. This focused on the general direction and goals of kiwi recovery as well as the issues and needs facing tangata whenua in relation to kiwi recovery. A glossary of Māori words and phrases can be found in Appendix 1.

Wider consultation included not only tangata whenua but also Conservation Boards, Zoo Aquarium Association (ZAA), Forest & Bird, Kiwis for kiwi, groups involved with kiwi in the regions (regional councils, community groups, etc.) and a variety of DOC staff at different levels, roles and business groups.

Several strategic documents are associated with and have an impact on kiwi conservation and the recovery plan. Summaries of these can be found in Appendix 2.

2.3 How the Recovery Plan fits with other kiwi documents

The Kiwi Recovery Plan (Fig. 1) is the overarching kiwi management document, providing strategic direction for all kiwi species and recovery participants. It helps to guide the work and allocate resources for DOC, Kiwis for kiwi and many other partners involved in kiwi recovery.

Beneath the Kiwi Recovery Plan are more prescriptive documents that lay out in greater detail the priorities, actions and requirements for different kiwi taxa (e.g. species/taxon plans) and for different national sectors (e.g. DOC Save Our Iconic Kiwi implementation plan, Kiwis for kiwi investment strategy and the captive management plan). There are also technical manuals and guidance documents (e.g. Kiwi Best Practice Manual, Kiwi Husbandry Manual) that will inform how management actions should take place.

Links to strategic and best practice documents for kiwi can be found at:

<https://www.kiwisforkiwi.org/resources/strategic-plans-documents/>

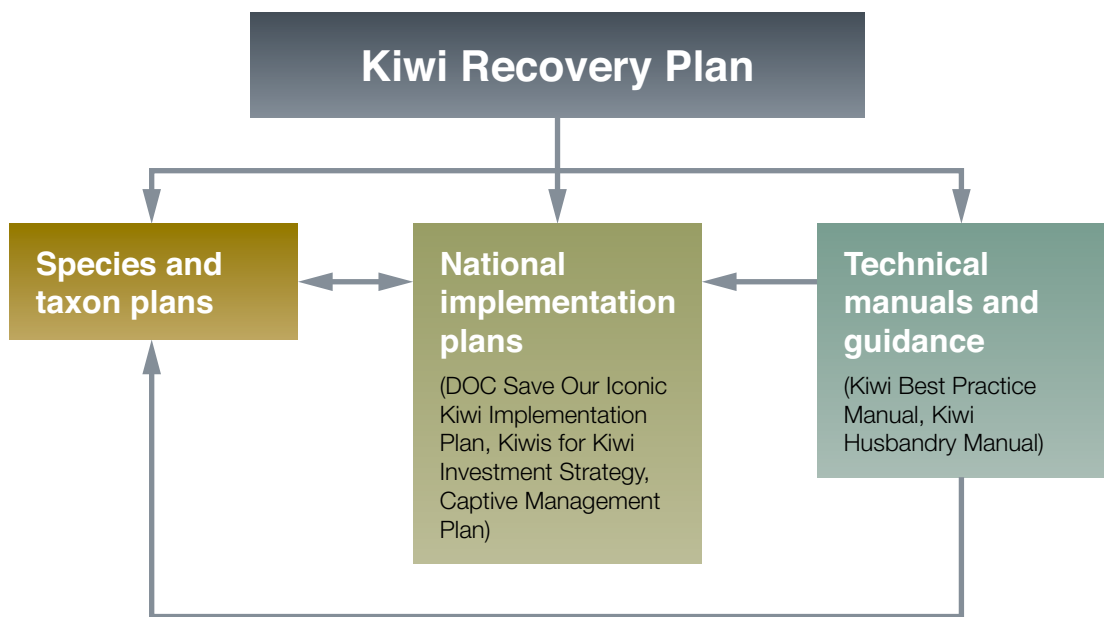


Figure 1. Conceptual diagram showing how the numerous kiwi strategic and technical documents fit together.

3. Context

3.1 Overview of species

3.1.1 Kiwi whakapapa

Whakapapa is about connectivity. In the Māori world view, people are connected to all things within the natural world. Kiwi are a taonga of the natural world and therefore, through whakapapa, we are related. This connectivity determines the role of Māori and stakeholders in kaitiakitanga (guardianship and protection). Central to kaitiakitanga is the concept of mauri (the life principle or vital essence of a being or entity) which is ever present within the realms of the natural world. When there is a negative change in the mauri of an ecosystem, that mauri is weakened and not strong. Protection of kiwi goes beyond a focus on a single species but involves the strengthening of mauri.

When Māori came to Aotearoa, kiwi were among the many bird species present. The kiwi whakapapa is explained and understood in different ways and can be specific to different iwi. The classification of kiwi began when different iwi settled or travelled through the regions. For example, a species that is classified under a common or scientific name may have two or three Māori names (Table 1). Very little is documented on the mātauranga that whānau, hapū and iwi hold for the kiwi, but several names are known.

Table 1. Common, scientific and Māori names of the five species of kiwi. Subspecies, taxa and evolutionarily significant units are listed below each species. See Appendix 3 for definitions of taxonomic and other technical terms.

COMMON NAME	SCIENTIFIC NAME	INGOA MĀORI
Little spotted kiwi	<i>Apteryx owenii</i>	Kiwi pukupuku, kukupapata iti
Great spotted kiwi	<i>Apteryx haastii</i>	Roroa, roa
Northwest Nelson		
Westport		
Paparoa Range		
Arthur's Pass		
Brown kiwi	<i>Apteryx mantelli</i>	Kiwi, kiwi a whenua toarua
Northland		
Coromandel		
Western		
Eastern		
Rowi	<i>Apteryx rowi</i>	Rowi
Tokoeka	<i>Apteryx australis</i>	Tokoeka, tokoweka, roa
Haast		
North Fiordland		
South Fiordland		
Rakiura	<i>A. australis lawryii</i>	

3.1.2 Species ecology and biology

For information about kiwi biology, natural history and differences among species, see *The Field Guide to the Birds of New Zealand*.¹ – see reference list at end of report

3.1.3 Past and present kiwi distribution

At present there are approximately 70 000 kiwi in New Zealand, split among 5 species and 14 taxa and evolutionarily significant units (Table 1; see Appendix 3 for definitions of technical terminology). Many of these taxa are expected to be formally elevated to separate species or subspecies within the term of this plan.

Archaeological remains, historical records and genetic data show that all species of kiwi were once more widespread than they are today (Fig. 2). The present distribution of kiwi is a mix of largely unchanged natural distributions (e.g. Rakiura tokoeka), remnant populations, and newly translocated populations on islands, mainland islands or fenced sanctuaries, some of which were re-establishing populations following local extirpation (Fig. 3).

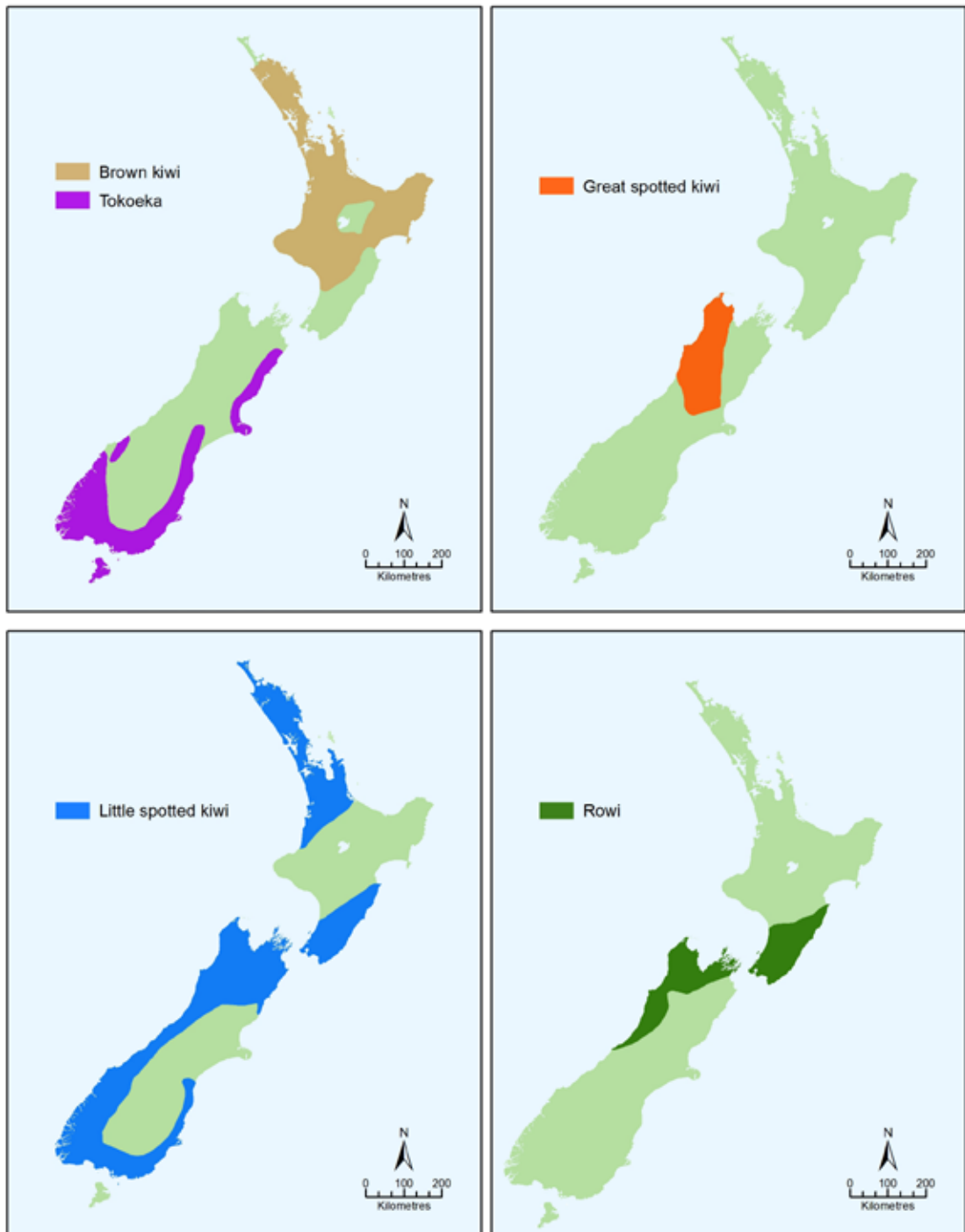


Figure 2. Estimated distribution of the five kiwi species in New Zealand before human contact (c. 1300 AD).

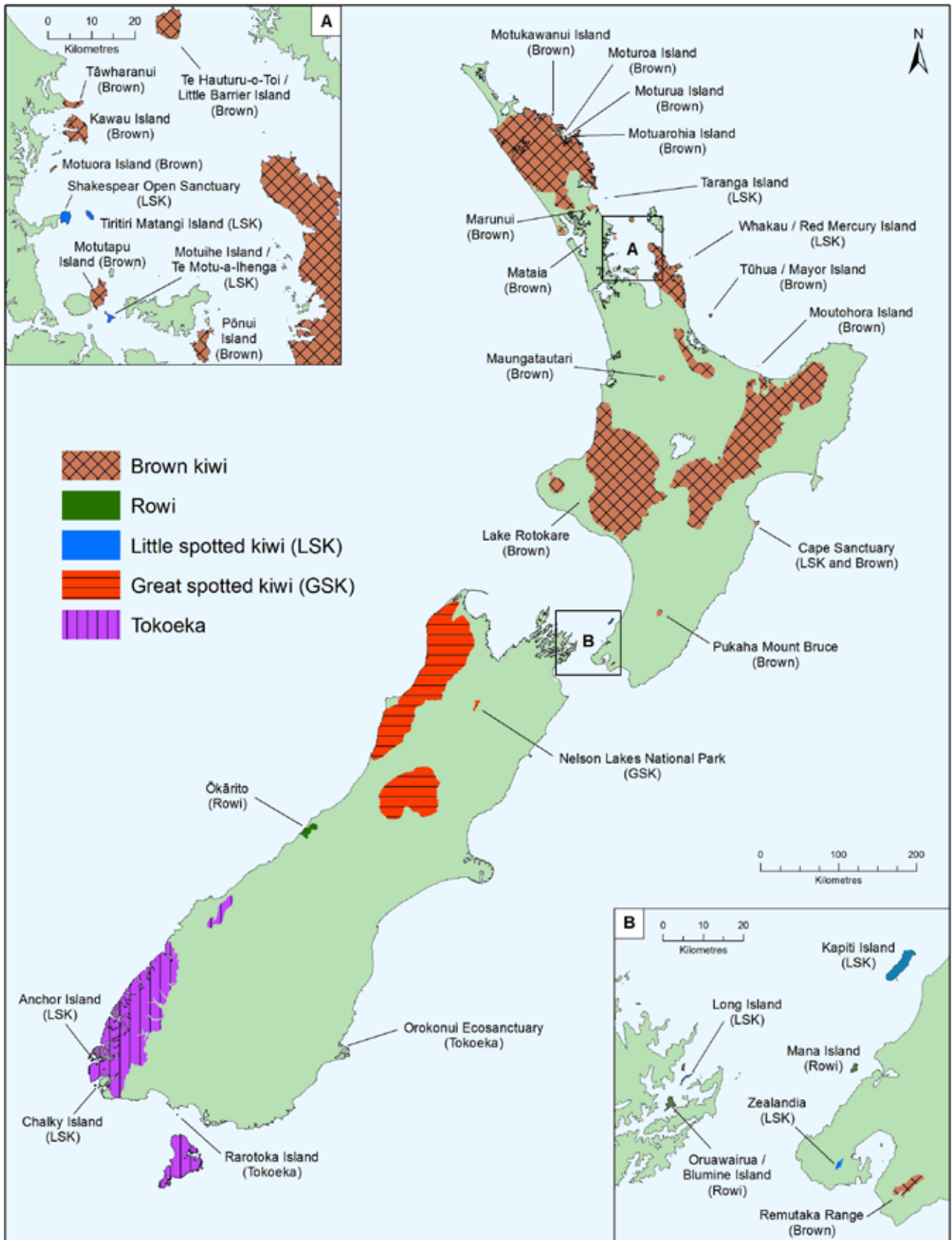


Figure 3. Distribution of the five extant kiwi species in New Zealand in March 2017.

3.1.4 Population estimates and species recovery phases

Estimates for kiwi populations in 2008² and 2018 are presented in Table 2, along with two projections for the next 15 years – one at the 2015 level and spread of management and the other with additional management through funds from Treasury³ (Save Our Iconic Kiwi (SOIK)). With improvements in predator control and additional synergies, growth and collaborative work (e.g. Battle for our Birds, OSPRI and Predator Free New Zealand), kiwi numbers may reach to or above 100 000 by 2030 (growth rate of 2% or more per annum and populations of the four rarest taxa increasing). However, substantial additional effort is required to reverse the overall potential decline of 2% per annum that is likely without this additional management.

In recovery planning for threatened species, DOC has adopted a model that identifies four phases of recovery actions: research to identify causes and key agents of decline; security from extinction; recovery; and maintenance⁴. The national and international threat classifications as well as the current phase of recovery for kiwi species and taxa are listed in Table 3.

3.1.5 Agents of decline and threats

Juvenile recruitment

Due to predation by stoats and to a lesser extent feral cats, very few kiwi chicks survive to become reproductive adults. This is the primary cause of decline for most kiwi populations. Without pest control, chick survival is about 6%^{6,7}, whereas in a managed population, chick survival can be as high as 60%⁷⁻⁹. The management of stoats alone can be sufficient to turn population trajectories around in many areas⁹.

Table 2. Population trend estimates for kiwi showing the progress made since the start of the 2008–2018 Recovery plan, and projections based on the assumptions in Innes et al. 2015³.

TAXON	ACTUAL	ACTUAL	PROJECTED	NEW
	ESTIMATE ^a	ESTIMATE ^b	ESTIMATE ^c	PROJECTION ^d
	2008	2018	2030	2030
Little spotted kiwi	1500	1900	2750	2750
Kapiti Island	1200	1200	1200	1200
Other sites	300	700	1550	1550
Great spotted kiwi	16000	14000	11600	19900
Brown kiwi	25000	25100	32100	35400
Northland	8000	8600	12300	12 300
Coromandel	1000	1900	3400	3400
Eastern	8000	7000	7300	9600
Western	8000	7600	9100	10100
Rowi	300	600	900	900
Tokoeka	29800	24850	21550	35050
Haast	300	450	750	750
N. Fiordland	10000	8200	7300	11 400
S. Fiordland	4500	3900	3500	5400
Rakiura	15000	12300	10000	17 500
Total	72600	66450	68900	94000

^a Based on the 2008–2018 Kiwi Recovery Plan².

^b Based on estimates in Innes et al. 2015³ projected to 2018.

^c Based on estimates in Innes et al. 2015³ projected to 2030 at existing levels of management.

^d Based on estimates in Innes et al. 2015³ projected to 2030 with increased management aimed at producing growth rates of 2% or greater for each taxon.

Table 3. Threat classification of kiwi and their phase of recovery.

TAXON	NEW ZEALAND THREAT STATUS ⁵	PHASE OF SPECIES RECOVERY
Little spotted kiwi	At Risk – Recovering	Recovery
Great spotted kiwi	Nationally Vulnerable	Research
Brown kiwi	At Risk – Declining	Recovery
Rowi	Nationally Vulnerable	Recovery
Tokoeka		
Haast	Nationally Critical	Recovery
North Fiordland	Nationally Vulnerable	Research
South Fiordland	Nationally Endangered	Research
Rakiura	Nationally Endangered	Research

The threat of dogs

The impact of dogs (*Canis familiaris*) is an increasing issue for kiwi, especially for populations located near people. All dogs, including pets, can kill adult kiwi. In Northland, it has been shown that the average lifespan of an adult brown kiwi is only 13–14 years rather than the 30–40 years measured in other brown kiwi populations. This is mainly due to predation by dogs. As kiwi are long-lived species with low reproductive rates, the loss of adults from populations is far more damaging than the loss of juvenile kiwi (from stoat predation). Where dogs are an issue, they can quickly undo years of kiwi conservation effort. The previous recovery plan² recognised this; however, limited progress has been made to reduce the impact of dogs on kiwi. If dog predation is reduced, it can result in substantial increases in kiwi populations (Fig. 4). The addition of juveniles through ONE (Operation Nest Egg) cannot make up for ongoing losses of adult kiwi in a population and cannot on its own lead to increases in declining populations.

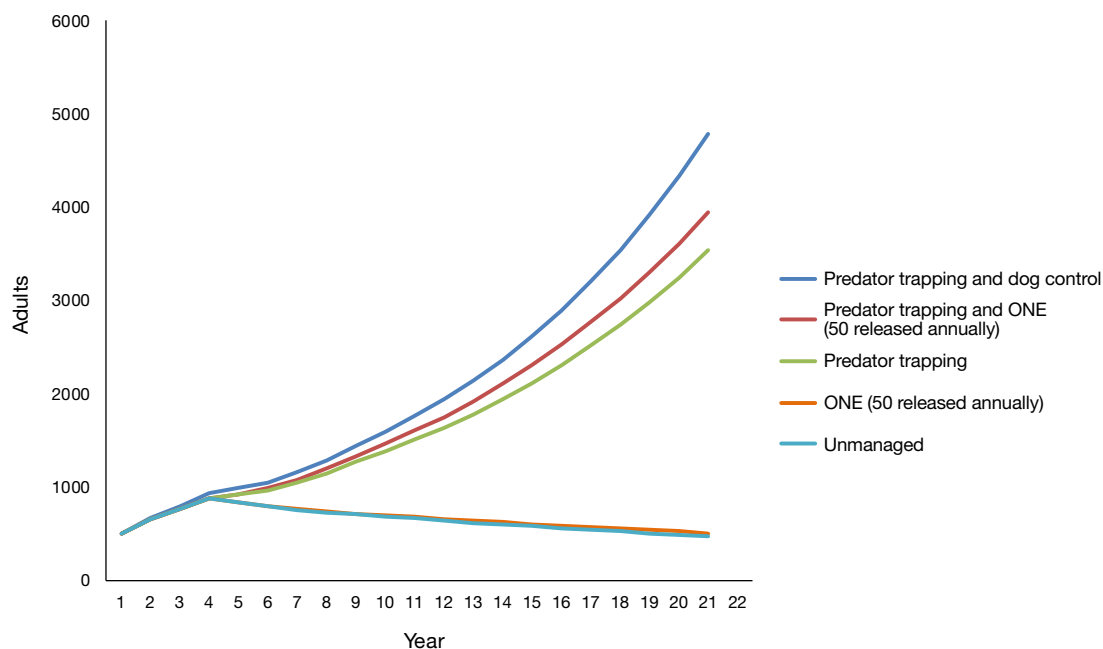


Figure 4. Estimated trajectories for kiwi populations under heavy pressure from dogs and populations with various combinations of trapping, Operation Nest Egg (ONE) and dog control. Though the parameters for these estimates were based on data from Northland kiwi populations^{7,9}, the inferences apply to any kiwi population where dogs present a threat. Effective dog control management means the impact of dogs is reduced to levels where adult kiwi survival is similar to that currently seen for brown kiwi populations outside Northland⁹

Dealing with ferrets

Predation of kiwi by ferrets (*Mustela furo*) is an increasing issue, especially for populations that live in drier, more rabbit-prone areas of New Zealand, but their impacts have also been noted in Northland, Hunua Ranges and Tongariro Forest. Ferrets are capable of killing adult kiwi and, as with dog predation, the loss of adults from a population is far more damaging than the loss of juveniles. This cannot be offset by chick survival through ONE or predator control for stoats. Although ferrets are normally associated with wetlands and rabbit-prone pasture, they can penetrate well into forests and cause the same sort of rapid population-level damage as dogs. Where ferrets are a potential threat to kiwi, predator trapping programmes should specifically target these pests, using appropriately lured DOC250 traps.

Genetic management

Genetic diversity is critical to the capacity of species to adapt in changing and challenging environments. It is also a key factor influencing the extinction risk for species and their constituent populations. Some basic genetic principles underlie the adaptation and genetic diversity seen in kiwi today. Because kiwi are flightless and have limited powers of dispersal, they typically show genetic isolation by distance^{10, 11} (see Appendix 4 for an explanation of isolation by distance). Furthermore, kiwi dispersal is extremely sensitive to barriers (e.g. rivers, ocean, mountains, glaciers), with the number of barriers often related to the distance between populations (i.e. longer distances are more likely to contain more barriers), further increasing the impact of isolation by distance¹².

In some populations, serious genetic issues (e.g. inbreeding) have been identified that threaten the health of both individual kiwi and of populations at a site. Some of these issues are the legacy of former management actions. However, we now have the genetic knowledge and management tools to ensure that we are providing current populations the highest chance of long-term success.

3.2 Kiwi conservation in the journey to a predator-free New Zealand

Introduced mammalian predators (such as possums, stoats and rats) have had huge impacts on kiwi and other indigenous species in Aotearoa/New Zealand. The scale of predator eradication operations has grown at an exponential rate since New Zealand pioneered a range of predator control technologies in the early 1960s (Fig. 5), with the significant growth of pest control knowledge and tools over the past decade in particular making this possible. It is predicted that this exponential trend will continue, and it is the basis of the Predator Free New Zealand 2050 (PF2050) project which commenced in 2016 (<https://predatorfreenz.org/about-us/pf-2050/>). PF2050 has substantial beneficial implications for increasing kiwi populations throughout New Zealand, including \$100 million in conservation work in Taranaki, Waiheke, Hawkes Bay, Wellington and Dunedin. DOC is currently investing an additional \$3 million per year in research and development of new tools to achieve this predator free goal, which will also provide new tools and more cost effective management options for kiwi recovery.

This work has considerable nationwide support. Successive New Zealand Governments have made significant resourcing commitments to the 2% per year increase in kiwi numbers (e.g. the Save Our Iconic Kiwi funding for management in Budget 2015 and the MBIE-funded 'Kiwi Rescue' research programme of Manaaki Whenua Landcare Research). Additionally, Budget 2018 added \$20 million per annum to DOC's baseline budget to sustain landscape-scale predator control for over 2 million ha of land. There is also an ever-increasing number of regional initiatives, such as Kiwi Coast, Project Taranaki Mouna, and whānau, hapū, iwi and community projects that will help bring the ultimate objective of a New Zealand that is free of key introduced predators within reach during the next 50 years. The ability to move towards such an inspirational and game-changing phase will be revolutionary for New Zealand conservation.

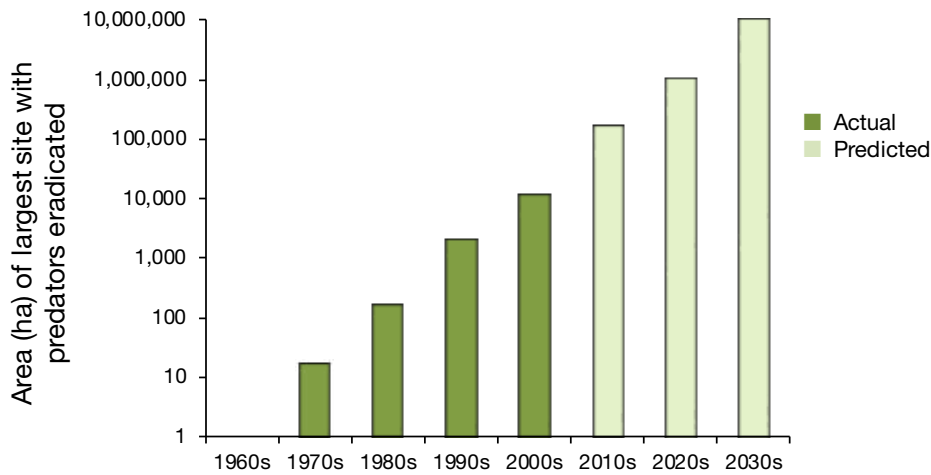


Figure 5. The area (ha) of the largest site where predators have been eradicated over eight decades. The first five decades are based on actual data while the last three decades are predicted estimates of eradication areas that will be feasible.

3.3 Past management and the species response

The national Kiwi Recovery Programme has successfully evolved since its inception over 25 years ago. The necessary strategy, laid out in a series of recovery plans^{2, 13, 14}, has guided collaborations across multiple agencies and organisations, allowing the programme to build upon gains in both knowledge and management techniques.

In 1991, DOC published the first Kiwi Recovery Plan¹³, and started to implement the Kiwi Recovery Programme in conjunction with the Bank of New Zealand and the Royal Forest and Bird Protection Society.

The initial phase of kiwi recovery work (guided by the first Kiwi Recovery Plan 1991–1996) focused on identification of the taxonomic and numerical status of the species, their distributions, the agents causing their decline and the current threats to each taxon. This work identified predation, particularly by stoats, ferrets and dogs, as the key agent of decline for kiwi. More accurate estimates of kiwi distribution and population size and trends were then made for each species; genetic, behavioural and ecological differences between kiwi were recognised; and ONE was developed to bypass predation of young chicks. Further details of achievements in the 1991–1996 period are provided in Appendix 1 of the second Kiwi Recovery Plan 1996–2006¹⁴.

The second phase of recovery (1996–2008), guided by the second Kiwi Recovery Plan 1996–2006¹⁴, focused on refining tools such as ONE and the management of kiwi populations via landscape-scale stoat trapping or aerial application of 1080. Five kiwi sanctuaries were established (at Whangarei, Moehau, Tongariro, Ōkarito and Haast) as part of the New Zealand Biodiversity Strategy, to protect the most threatened kiwi taxa (rowi and Haast tokoeka) and three populations of brown kiwi. Little spotted kiwi were returned to the mainland at Zealandia in Wellington. During its term, there was a strong growth in the number and scale of community-led projects for kiwi recovery. The BNZ Save the Kiwi Trust was established as a formal partnership between BNZ, Forest & Bird and DOC. Further details of achievements during this period (1996–2008) are provided in Appendix 1 of the third Kiwi Recovery Plan 2008–2018².

The third phase of kiwi recovery (2008–2018), guided by the third Kiwi Recovery Plan 2008–2018², focused on expanding management efforts over a greater area and empowering communities to manage their local kiwi populations. The emphasis has been on managing kiwi as part of healthy functioning ecosystems, where kiwi management is expected to benefit other native flora and fauna as well. In some cases, the focus has also been on kiwi in isolation as part of the ONE programmes, which are used to rapidly build populations of the rarest taxa or to engage

communities or through kōhanga kiwi, where kiwi are established at zero- or low-density predator sites (islands or behind fences) and offspring harvested to create new populations or to supplement existing wild populations. This period has seen a proliferation of community-led projects, especially in the North Island, and stronger security of the three rarest taxa (rowi, Haast tokoeka and little spotted kiwi) through ONE programmes, and the establishment of kōhanga kiwi and/or new secure populations. Further details of progress during this period (2008–2018) can be seen in the Kiwi Recovery Plan Midterm Review¹⁵.

3.4 Current state of management

Management of kiwi over the past 25 years has halted or reversed the decline of the three rarest kiwi (little spotted kiwi, rowi and Haast tokoeka). However, the five more numerous kiwi taxa (brown kiwi, great spotted kiwi, northern Fiordland tokoeka, southern Fiordland tokoeka and Rakiura tokoeka) are still declining because the majority of their populations are not receiving active conservation management. The current rate of decline of unmanaged populations of kiwi is close to 2% at most sites, although in Northland the true rate is probably closer to 3% because dogs kill many adult kiwi⁷.

As of 2015, the majority of kiwi (76%) received no management³. Where a large proportion of a species or evolutionarily significant unit is managed – by DOC, community or tangata whenua – the results are significant and growth rates are high (e.g. rowi and Coromandel brown kiwi; Fig. 6). Where the vast majority of birds are unmanaged, there are significant decline rates (e.g. great spotted kiwi; Fig. 6).

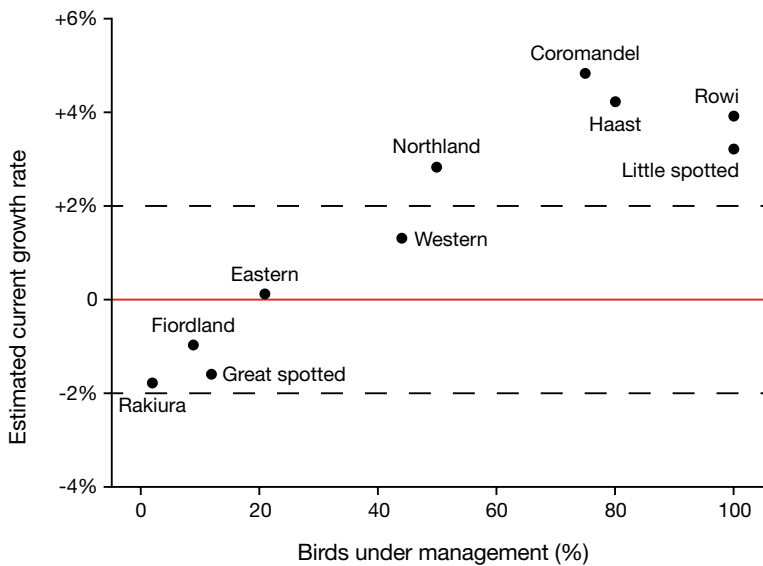


Figure 6. Relationship between the proportion of the kiwi population that is managed and the estimated rates of annual population increase or decrease for ten types of kiwi (adapted from Innes et al. 2015³ and populations of the four rarest kiwi taxa are increasing. However, substantial additional effort is required to reverse the overall potential decline of 2% per annum (without management). Estimates are based on the information available; they do not represent exact figures and do carry some level of uncertainties. Kiwi species/ taxa above the zero line are increasing and below the 0% growth line are decreasing.

3.5 A new phase of conservation: increasing the scale of *in situ* management

This Recovery Plan marks a new phase of kiwi recovery. For the first time, there is a focus and plan to increase *all* kiwi species by at least 2% per year. In particular, this will require reversing the decline in South Island species, which are spread across vast areas of tough terrain where the reduction of predators is difficult. The achievement of these goals at a national level will require a focus on *in situ* management involving pest control at ever increasing scales.

This work has already started. In Northland, Taranaki and Coromandel, whānau/hapū/iwi and community groups have begun to create connections between the land areas they manage to create large corridors of continuous, protected habitat. DOC is extending the boundaries of predator-managed sites, showing that kiwi numbers can increase in areas of over 10 000 ha when they are managed using aerial toxins or, in a few situations, trapping. Managing larger areas (landscapes) offers huge benefits to kiwi and other wildlife by providing longer respite from predators before they reinvade and extended safe habitat for dispersing juveniles.

To grow all kiwi species by 2% each year, it will still be necessary to actively manage kiwi species with extremely small populations (rowi, Haast tokoeka) and significant genetic challenges (little spotted kiwi). The gains made by North Island brown kiwi will also need to be maintained and grown. The greatest new challenge however, will be to control predators at a landscape scale (100 000s of hectares) to reverse the decline of great spotted kiwi and tokoeka on the South Island.

4. Ngā mātāpono me ngā whāinga – Principles and goals

4.1 Ngā mātāpono – Recovery principles for kiwi

The following guiding principles represent a broad overarching philosophy and are essential for guiding successful kiwi recovery irrespective of who is doing the work or what work is being carried out. Organisations and kiwi practitioners should integrate these principles into their work and decision-making.

Kāore he korehāhā – No extinction

The highest priority for recovery management is to ensure that all kiwi species survive.

Whakaoranga kaha – Strong recovery

Survival alone is not enough; all kiwi species will grow by at least 2% per annum.

Rerenga ā-ira – Genetic diversity

The genetic diversity and distribution of each species or subspecies will be maintained or enhanced as much as is feasible.

Whakanui ake i ngā hua pūnaha hauropi – Maximisation of ecosystem benefits

Kiwi recovery will, wherever possible, focus on gaining maximum benefits for the wider ecosystem.

Whakahaere ki ngā nohoanga tūturu – *In situ* management

Kiwi will be managed within their natural range or, if outside this range, with the overall aim of restoring them to their natural range in the wild.

Oranga kararehe – Animal welfare

The welfare of the birds will be a primary consideration in all aspects of kiwi recovery.

Whanaungatanga – Relationships

The new and existing relationships between DOC, tangata whenua, organisations, communities and the public will continue to be respected and nurtured as we work together in the recovery of kiwi for present and future generations.

Mātauranga & tohungatanga – Knowledge & expertise

Knowledge and ideas will be pursued that will strengthen and grow our kiwi populations and all those involved with their recovery. This puna mātauranga or pool of knowledge will be shared amongst kiwi practitioners for the betterment of all kiwi and people involved.

Rangatiratanga – Leadership

A high degree of personal and organisational integrity, professionalism, and ethical behaviour will be maintained in all actions and decisions involving the protection of kiwi.

Kaitiakitanga – Guardianship

Collectively, work will be undertaken to protect the environment, knowledge and resources required to reverse the decline of kiwi populations. If kiwi and their ecosystems are healthy, all New Zealanders benefit.

4.2 Long-term recovery goal

To reach 100 000 kiwi by 2030 through:

- Growing all kiwi species by at least 2% per year
- Restoring their former distribution and
- Maintaining their genetic diversity.

Use of the term ‘species’ in both the long-term and recovery-plan-period goals in this document refers to all recognised kiwi species, subspecies and evolutionarily significant units.

Genetic diversity is the sum of genetic information contained in the genes of all individuals of a particular species. Populations with high levels of genetic diversity are better able to adapt to changes in habitat and climate or new diseases. Strategies must be put in place to minimise genetic loss and to maintain kiwi genetic diversity.

4.3 Recovery-plan-period goals

4.3.1 Management

Goal 1.1: To achieve at least a 2% increase per annum for each kiwi species.

Goal 1.2: To increase the number of viable populations of rowi and Haast tokoeka in the wild within the former ranges of these species.

Goal 1.3: To expand the current distribution of brown kiwi, great spotted kiwi and little spotted kiwi into areas of their former range.

Goal 1.4: To maintain current levels of genetic diversity at a species level.

Goal 1.5: To measure population growth rates for all kiwi species.

Goal 1.6: To reduce the number of kiwi killed by dogs and ferrets.

4.3.2 Research and innovation

Goal 2.1: To increase mātauranga and knowledge of the biology, population ecology and response to management of kiwi, especially for the South Island species.

Goal 2.2: To develop more cost-efficient and effective survey and monitoring tools for both kiwi and the species that threaten them, including systems to manage the data collected.

Goal 2.3: To improve and develop tools for sustainable landscape-scale and small-scale pest management.

Goal 2.4: To communicate research and development findings for the benefit of the kiwi conservation community.

4.3.3 Engaging people with kiwi and their recovery

Goal 3.1: To support tangata whenua to engage in meaningful kaitiakitanga of their kiwi.

Goal 3.2: To maximise the effectiveness and impact of community-, whānau-, hapū- and iwi-led projects to meet the management goals for kiwi recovery.

Goal 3.3: To strategically guide the establishment of new kiwi projects to maximise the connectivity between projects and the scale of protected habitat, and to target areas and species in need.

Goal 3.4: To increase New Zealanders’ connections with kiwi and the ecosystems they inhabit, thereby increasing their willingness to become kaitiaki of our kiwi and the wider environment.

4.3.4 Growing and sustaining the kiwi conservation effort

Goal 4.1: To ensure the long-term sustainability of kiwi conservation efforts.

5. Implementation

This section provides direction for the term of this plan for DOC, whānau/hapū/iwi, community groups and other managers and practitioners involved in kiwi recovery by identifying:

- What should happen
- Who should do it
- Where it should happen
- When it should happen

This plan is grouped into four themes based on achieving the recovery plan period goals:

- Management
- Research and innovation
- Engaging people with kiwi and their recovery
- Growing and sustaining the kiwi conservation effort

Under each theme are topics with background, issues, objectives and actions to resolve the issues. Some actions are at a strategic (less-specific) level, with the specifics that need to be developed included in other documents (e.g. species or regional plans). The relevance of all actions to each of the kiwi species can be found in Appendix 5.

All actions have been prioritised and scheduled (see Appendix 6) and their relevance to DOC's Intermediate Outcome Objectives and Stretch Goals have been identified (see Appendix 7). Actions are prioritised to identify those necessary to achieve the recovery of all kiwi species nationally. Priorities are marked as follows:

- **Essential:** Necessary 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 this 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 this plan, but with least risk if not completed 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 complete the action. Rather, priorities are given to assist with choice if required.

Actions are predominantly scheduled until 2023, except those that are relevant throughout the recovery plan period. This reflects the increasing uncertainty in assigning timeframes beyond 5 years and the need to review progress for all actions by 2023.

Defining accountability in a conservation partnership

To increase kiwi numbers nationally requires the efforts and cooperation of many – government agencies, whānau/hapū/iwi, community groups, organisations and individuals. Part of this conservation partnership is the recognition that all partners have a sense of accountability and responsibility to the kiwi we are trying to protect, to each other, to taxpayers and funders and, for some, to the government. This Recovery Plan list groups which are accountable for completing each action to reach the national goals.

While accountability exists for all kiwi recovery partners, the type of accountability differs. As a government department resourced by New Zealand taxpayers, DOC holds statutory and legal accountability to protect and manage kiwi under Section 6a of the Conservation Act 1987 and the Wildlife Act 1953. Section 4 of the Conservation Act 1987 and the Treaty of Waitangi also require DOC to apply Treaty principles and meet the Crown's obligations to Māori in its work. DOC Operational Managers at each location will endeavour to meet objectives; however, they will need to weigh up competing priorities according to DOC's annual business planning process.

The accountability of other partners – whānau/hapū/iwi, organisations and groups – will differ according to resources and ability. By being a partner in kiwi conservation, these groups take ownership and responsibility for their work and responsibility for kiwi. In most instances, there is no legal obligation. Where there is capability and capacity, mana whenua should be encouraged to lead/engage in this work and be supported to fulfil their role as kaitiaki. They have been listed in some action accountabilities, but there will be variability in their ability to carry out these actions depending on the whānau, hapū or iwi involved. This understanding of accountability applies to community groups as well. Implementation of actions by non-governmental groups may be impacted by the availability of funding.

5.1 Management

5.1.1 Topic 1 – Pest control

In situ management of kiwi through pest control over large areas (landscapes) is the most effective and cost-efficient way to meet long-term kiwi recovery goals. Effective pest control provides benefits that extend beyond protecting kiwi. It can improve the health and function of ecosystems and allow the recovery of other species. Successful ground-based pest control technologies exist to protect kiwi (e.g. trapping, toxins); however, they typically have high associated labour costs. This limits their applicability, as management over very large areas is needed to halt the decline of kiwi. New ground-based stoat control technologies have been tested and developed. These may have potential to protect kiwi over larger scales than current ground-based technologies, with reduced costs and effort on the ground. Other technologies (e.g. aerial application of PAPP) may also provide new opportunities for kiwi management. In addition, aerially applied 1080 has been tested and shown to be effective at landscape scales to protect brown kiwi from stoat predation in the North Island when carried out at a suitable frequency.

Issues

Issue 1.1 Reliance on a single method for pest control in an area can lead to pests becoming resistant to toxins or averse to traps, therefore decreasing the effectiveness of that tool (e.g. untrappable stoats).

Issue 1.2 Some methods/traps will not effectively target all pests (e.g. DOC150 or DOC200 traps for stoat control are not best practice for ferrets).

Issue 1.3 There are too few landscape-scale (> 10 000 ha) pest control operations that benefit kiwi and even fewer sustained predator control operations at the scale (> 200 000 ha) needed for effective management of widely-dispersed, low-density species such as great spotted kiwi.

Issue 1.4 There is currently a poor understanding of the link between pest management and outcomes for South Island kiwi species, as well as wider ecosystem impacts.

Issue 1.5 There is an ongoing risk of pest mammal incursion on predator-free islands and fenced sanctuaries.

Issue 1.6 Best practice pest control is not being universally applied, especially with respect to controlling ferrets.

Issue 1.2 New pest control technologies that are developed will need to be fit for purpose for kiwi management and readily accessible for use.

Issue 1.2 Use of toxins may temporarily reduce people’s access to food resources due to the required stand-down periods following their application. This can affect local iwi who may rely on the treated area as a pātaka (storehouse) for food resources.

Objectives

Objective 1.1 To have sufficient kiwi habitat under sustained effective management to grow kiwi populations, especially for South Island species.

Objective 1.2 To improve the cost-effectiveness and efficacy of a suite of pest management tools for kiwi over the long term and over large areas.

Objective 1.2 To have strong coordination of effort and geographical connectivity between national and regional pest control operations for the benefit of kiwi and their ecosystems.

Objective 1.4 To understand the response of all kiwi species to important management practices.

Objective 1.5 To keep kiwi islands and fenced sanctuaries predator-free.

ACTION	ACCOUNTABLE GROUP (SUPPORTING / AFFECTED GROUPS)	PRIORITY
1.1 Increase continuous or regular landscape-scale pest control, particularly for South Island kiwi, throughout the term of this plan.	DOC Operations; (DOC Biodiversity, mana whenua, community)	Essential
1.2 Measure the response to management of South Island kiwi to determine optimal landscape-scale management regimes (same as Action 4.4).	DOC Operations; (DOC Biodiversity, mana whenua)	Essential
1.3 Control predators of kiwi using a variety of pest control tools throughout the term of this plan to reduce the potential of resistance or avoidance to any one method and to ensure all pests that threaten kiwi populations are effectively targeted.	All	Essential
1.4 Create and maintain several monitored kiwi sites suitable for testing and developing new pest control tools (e.g. kiwi sanctuaries, mainland islands).	DOC Operations; (DOC Biodiversity; Kiwi Recovery Group, mana whenua)	High
1.5 Actively support pest management activities of groups and agencies and encourage them to collaborate to increase the scale and connectivity of protected habitat.	Kiwis for kiwi, DOC Operations; (DOC Biodiversity; Kiwi Recovery Group, mana whenua)	High
1.6 Support community groups, whānau/hapū/iwi and DOC staff to ensure that best practice pest control is in place and operating effectively to protect kiwi. This includes managing ferrets, especially in areas near or prone to high or fluctuating rabbit populations.	Kiwis for kiwi; DOC Operations; DOC Biodiversity; (mana whenua)	Essential
1.7 Support pest-free islands and fenced sanctuaries with kiwi to ensure that they remain pest-free.	DOC Operations, fenced sanctuaries (mana whenua)	High
1.8 Support the establishment of predator-free Stewart Island/Rakiura.	DOC Operations (Kiwi Recovery Group, mana whenua)	High
1.9 Test whether a population of little spotted kiwi can be established without a predator exclusion fence in a predator-managed site on the mainland.	DOC Operations (DOC Biodiversity, Kiwi Recovery Group, mana whenua)	High

5.1.2 Topic 2 – Threat of dogs to kiwi

Dogs are the greatest threat to adult kiwi in areas where kiwi habitat overlaps with or is close to human populations or activity. The impact of dogs will increase as kiwi and human populations grow.

Addressing the impact of dogs is a complex challenge as it is a social issue that requires a change of culture amongst dog owners. The impact of dogs stretches far beyond kiwi. Dogs pose a significant threat to over 50 species of native wildlife as well as livestock. Furthermore, in New Zealand, dog attacks on humans also pose a serious threat, with more than 99 000 attacks recorded over a 10-year period, more than a third of which involved children, many of whom sustained facial injuries¹⁶. In 2011 alone, the Accident Compensation Corporation (ACC) covered 11 708 claims by dog-attack victims at a cost of NZ\$2.4 million¹⁷.

Progress has been made in kiwi aversion training for dogs. While it is the best tool currently available, it may give some dog owners a false sense of security and it also needs to be complemented with other education tools for dog control and preventing attacks. It also does not solve the wider issue of dog impacts on other wildlife and stock.

Issues

Issue 2.1 All dogs are a significant potential threat to adult kiwi.

Issue 2.2 The threat of dog attacks extends to other wildlife species, livestock and people.

Issue 2.3 Dog owners have varying degrees of awareness, commitment, capacity and ability to avoid having their dogs attack kiwi.

Issue 2.4 A broad suite of tools to address the dog issue is needed, but not presently available. The tools need to be affective for a wide diversity of dogs and owners.

Issue 2.5 Tools for dog control and monitoring dog presence require further refinement to increase their efficacy.

Issue 2.6 Kiwi avoidance training appears less effective for pet dogs than working dogs.

Issue 2.7 Permitting requirements to take dogs onto public conservation land where kiwi reside are inconsistent nationally and put kiwi at risk.

Issue 2.8 There has been a lack of preparedness to collect evidence and pursue prosecutions of owners of dogs that have killed kiwi.

Objectives

Objective 2.1 To engage a range of stakeholders (e.g. ACC, Councils, farmers, hunters) to work collaboratively to address the threat of dogs.

Objective 2.2 To proactively and reactively use current and new tools to reduce the threats dogs pose to kiwi.

ACTION	ACCOUNTABLE GROUP (SUPPORTING / AFFECTED GROUPS)	PRIORITY
2.1 Develop and sustain collaboration between agencies, groups and councils to progress the issues of responsible dog ownership and dog control.	DOC Operations; DOC Biodiversity; DOC Policy and Visitors; DOC Partnerships; Kiwis for kiwi; Forest & Bird	Essential
2.2 Advocate for the development of interagency capacity and protocols to monitor for dog presence and respond to incidents where dogs are killing kiwi.	DOC Operations; (regional and district authorities; Kiwis for kiwi; Manaaki Whenua Landcare Research)	High
2.3 Effectively educate, engage and empower people to reduce the threats of dogs to kiwi.	DOC Operations; Kiwis for kiwi; DOC Biodiversity	High
2.4 Refine avian avoidance methods and equipment for dogs.	Kiwis for kiwi; DOC Biodiversity (Manaaki Whenua Landcare Research)	High
2.5 Research options for minimising the impact of dogs.	DOC Biodiversity (Manaaki Whenua Landcare Research; Kiwis for kiwi)	Medium

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ACTION	ACCOUNTABLE GROUP (SUPPORTING / AFFECTED GROUPS)	PRIORITY
2.6 Advocate for consistency with the permitting requirements to bring dogs into public conservation land with kiwi.	DOC Operations; (Kiwi Recovery Group; Forest & Bird)	Medium
2.7 Provide training on how to collect evidence suitable for prosecution of dog owners where dogs kill kiwi.	DOC Operations	Medium

5.1.3 Topic 3 – Genetic management

Genetic diversity is critical to the capacity of species to adapt in changing and challenging environments and is an important factor influencing the extinction risk for populations and species. Genetic principles must be applied when managing kiwi, as these will minimise inbreeding and gene loss in both wild and captive populations, maximise translocation and ONE success, and aid the long-term survival of kiwi species. The most important reservoirs of genetic diversity exist within large natural populations; therefore, these stronghold populations must be a priority for management to ensure diversity is not lost. In almost all cases, protection of large natural populations is of higher priority for the achievement of long-term recovery goals than the use of translocations, kōhanga kiwi and ONE to create new populations which would contain only a subset of the original diversity.

Genetic analysis of kiwi within a population plays a significant role in resolving taxonomic uncertainties and defining the species/subspecies/evolutionarily significant units that are used to direct recovery actions and resources. Genetic tools can also provide information about individual and population characteristics (e.g. sex, effective breeding population size, gene flow) and can be used for wildlife forensics (e.g. identification of a dog-killing kiwi).

Little spotted kiwi (*Apteryx owenii*, LSK) face extreme genetic challenges and critically low genetic variation because the entire species was reduced to five individuals¹⁸. This has resulted in low viability in at least one translocated population¹⁹. Rowi and Haast tokoeka have also been reduced to small populations; however, sufficient genetic diversity remains for them to recover with suitable management. Brown kiwi, great spotted kiwi and northern and southern Fiordland tokoeka retain good levels of genetic diversity. These species/taxa show isolation by distance (see Appendix 4) and have some sites with inbreeding/poor genetic representation.

Issues

Issue 3.1 A lack of knowledge and understanding of the importance of genetics for long-term kiwi conservation has resulted in some poor management actions (e.g. the creation of genetic bottlenecks and hybrid populations).

Issue 3.2 The results of genetic research are not always publicly available, clear or incorporated into management and education.

Issue 3.3 There is confusion about how to manage hybrid and mixed provenance individuals, as well as individuals and populations that are suspected to contain deleterious alleles/genes.

Issue 3.4 There is a lack of clear records, consistency or coordination of kiwi genetic samples, which are spread across various locations and organisations.

Issue 3.5 There is a need to increase research on non-invasive genetic techniques and genomic approaches for the conservation management of kiwi.

Issue 3.6 Little spotted kiwi have limited genetic diversity due to their having experienced an extreme bottleneck.

Issue 3.7 Confirmation is needed about the appropriate kiwi taxa/evolutionarily significant units to manage to retain remaining genetic diversity.

Objectives

Objective 3.1 To maintain the existing genetic diversity of all kiwi, especially little spotted kiwi, rowi and Haast tokoeka.

Objective 3.2 To ensure managers and practitioners have an understanding of the importance and practical application of genetic principles in kiwi management.

Objective 3.3 To clarify the uncertainties in the taxonomy of kiwi and the roles of hybrid and mixed provenance populations for kiwi management.

Objective 3.4 To have strong collaboration between organisations and individuals holding genetic samples.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/ AFFECTED GROUPS)	PRIORITY
3.1 Incorporate sound genetic principles into management and national strategies (e.g. species/regional/taxon plans).	Kiwi Recovery Group; Kiwis for kiwi; DOC Operations	Essential
3.2 Create a national genetic management plan for kiwi that identifies key principles and how they can be applied to management.	Kiwi Recovery Group	Essential
3.3 Formalise and publish the taxonomy of kiwi, including confirmation of the appropriate taxa and/or evolutionarily significant units that should be managed.	Kiwi Recovery Group; (external geneticists and taxonomists; Manaaki Whenua Landcare Research)	High
3.4 Determine the risks and benefits of hybrid and mixed provenance populations and the role they can play in kiwi management and make management decisions accordingly.	Kiwi Recovery Group; (external geneticists; mana whenua)	Medium
3.5 Create a database of genetic samples to encourage the long-term sustainability of sample data, better use of resources, and better collaboration between research groups.	Kiwi Recovery Group; (DOC Biodiversity; kiwi practitioners; external geneticists; mana whenua)	Medium
3.6 Support current and future efforts to incorporate genetic technologies into kiwi management (e.g. non-invasive tools).	Kiwi Recovery Group; DOC Biodiversity; DOC Operations	Medium
3.7 Ensure all little spotted kiwi populations have sufficient founders to provide the genetic diversity needed for long-term survival.	DOC Operations; (DOC Biodiversity; little spotted kiwi partners)	Essential
3.8 Use ONE to help retain genetic diversity of unmanaged populations of Haast tokoeka.	DOC Operations	High

5.1.4 Topic 4 – Measuring management effectiveness

It is vital that the effectiveness of management is measured and that these results inform and direct future recovery actions. It is possible to kill large numbers of predators and yet not achieve our conservation goals. This is especially true for kiwi, because chicks are susceptible to even low predator numbers. Additionally, the tools currently available for monitoring stoat presence are not as sensitive as kiwi chick survival. The two main tools for measuring management effectiveness and developing more successful conservation actions are:

- **Monitoring** – Measuring population numbers and trends to assess changes over time
- **Survey** – Measuring the distribution and status of populations

Measuring the effect of management regimes on population parameters (mortality, recruitment, etc.) will lead to more effective planning for future work, especially for South Island and Stewart Island/Rakiura kiwi. Furthermore, surveying to fill knowledge gaps will ensure that conservation dollars are spent where they can most effectively achieve kiwi recovery goals.

Issues

Issue 4.1 Measuring kiwi population trends and distributional changes requires a long-term commitment of effort, which can be difficult to maintain with short-term funding cycles.

Issue 4.2 Brown kiwi tools may not be suited for South Island and Stewart Island/Rakiura species, low-density sites and easily disturbed kiwi (e.g. great spotted kiwi).

Issue 4.3 There is a general lack of new survey information required to update distribution maps and help inform management decisions.

Issue 4.4 The full potential of synergies between national survey programmes (e.g. DOC national biodiversity monitoring, NatureWatch NZ, eBird) and kiwi monitoring are not being realised.

Issue 4.5 There is a need for sensitive, cost-efficient tools for measuring pest abundances at low density and/or accurate kiwi outcomes. As these new technologies become available, protocols and analysis tools will be needed and must be communicated to practitioners.

Issue 4.6 The relationship between kiwi call counts and changes in population density are not consistent.

Issue 4.7 Statistical expertise is rarely sought prior to data collection.

Objectives

Objective 4.1 To successfully measure management effectiveness and the state of and change in kiwi populations.

Objective 4.2 To inform kiwi recovery priorities and management requirements with accurate survey and monitoring data.

ACTION	ACCOUNTABLE GROUP (SUPPORTING / AFFECTED GROUPS)	PRIORITY
4.1 Identify national and regional survey priorities and strategically fill information gaps, especially for South Island and Stewart Island/Rakiura kiwi species.	Kiwi Recovery Group; regional and species groups; DOC Operations; mana whenua	Essential
4.2 Implement a long-term monitoring programme to evaluate whether the 2% gain goal is being met for each kiwi species (supported by the Save Our Iconic Kiwi bid).	DOC Operations; (DOC Biodiversity; Kiwi Recovery Group; Kiwis for kiwi; mana whenua)	Essential
4.3 Improve survey and monitoring tools, including the use of mātauranga Māori.	Kiwi Recovery Group; (DOC Biodiversity; Manaaki Whenua Landcare Research; tangata whenua)	High
4.4 Measure the response of South Island kiwi populations to management to determine optimal landscape-scale management regimes (same as Action 1.2).	DOC Operations; (DOC Biodiversity; Kiwi Recovery Group; external researchers; Kiwis for kiwi)	High
4.5 Set up systems to ensure that survey and monitoring tools, including cultural tools, are used consistently so that data are comparable over time and space.	Kiwi Recovery Group; (DOC)	High
4.6 Facilitate multi-stakeholder collaborations to collect data and report on changes to the distribution and state of kiwi populations.	DOC Biodiversity; (DOC Operations; Kiwi Recovery Group; Kiwis for kiwi)	Medium

5.1.5 Topic 5 – Data management

Currently, kiwi data are widely dispersed and in variable formats, making it difficult to analyse and report on them at a national or regional level. These data include information at an individual and population level, spatial information, acoustic recordings, genetic samples and other information. The data are at risk without a curation solution. Robust analysis and reporting would improve and inform management decisions and are critical to evaluating recovery progress. Many kiwi datasets have been, and continue to be, gathered throughout the country.

This ranges from kiwi call count monitoring and intensive radio-tracking projects to DOC’s long-term population monitoring at specific sites. Robust and collaborative data management is needed to maximise the impact of all the kiwi data that are available.

Issues

Issue 5.1 While essential for informing on-the-ground management, kiwi data management and analysis are rarely resourced appropriately.

Issue 5.2 The value of data for informing effective management is not well understood by some practitioners, decision-makers and end-users.

Issue 5.3 Datasets that contain irreplaceable data are at risk of being lost because of high rates of staff/volunteer/technology turnover.

Issue 5.4 Data are widely dispersed in variable formats and are often difficult to access for analysis.

Objectives

Objective 5.1 To manage and analyse data in a way that provides ownership/intellectual property protection yet also allows for robust measurement of management effectiveness and informs future kiwi recovery.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
5.1 Implement systems to curate historic, current and future priority kiwi data using automated analysis and reporting and user-friendly systems where possible.	DOC Biodiversity; DOC Operations; Kiwis for kiwi; Kiwi Recovery Group	Essential
5.2 Appoint a person to assist with the management of priority kiwi data.	DOC Biodiversity; (Kiwis for kiwi)	High

5.1.6 Topic 6 – Recovery planning: national level

Over the past 25 years, the national Kiwi Recovery Programme has grown to comprise the work of over 100 partners. It includes DOC, tangata whenua, community groups, operators of captive facilities, Forest & Bird, philanthropists and research organisations. Effective strategic direction (i.e. this plan) and leadership ensures this work is integrated and moving towards a national kiwi recovery goal. This overarching strategy will be complemented by other plans (e.g. Kiwis for kiwi strategy, DOC operational work, species/regional plans, whānau/hapū/iwi mahi). The Kiwi Recovery Group is the national technical and strategic advisory group for kiwi recovery and its members represent the many facets of kiwi recovery work.

Issues

Issue 6.1 The scale and complexity of kiwi recovery makes it challenging to guide.

Issue 6.2 The Recovery Plan needs regular review to remain fit for purpose.

Issue 6.3 Currently, confusion exists around the accountability for decision-making in kiwi recovery.

Objectives

Objective 6.1 To ensure that the Recovery Plan remains effective and relevant.

Objective 6.2 To ensure that the Kiwi Recovery Group gives free and frank advice, successfully sets strategic direction and oversees kiwi recovery at an appropriate scale.

Objective 6.3 To ensure stakeholders have access to resources and high-quality advice.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
6.1 Prepare annual progress reports for the recovery plan objectives and communicate these to DOC, other stakeholders and all parties accountable for the planned actions.	Kiwi Recovery Group; DOC Operations	High
6.2 Review recovery progress of this plan at the half-way mark in 2023 and assess whether adjustments are needed.	Kiwi Recovery Group	Essential
6.3 Review membership of the Kiwi Recovery Group every 2 years or as required to reflect key relationships and ensure for long-term sustainability for as well as being fit for purpose to meet current needs.	Kiwi Recovery Group; Natural Heritage Specialist Group coordinator	Medium
6.4 Communicate the purpose and work of the Kiwi Recovery Group to all stakeholders and decision-makers throughout the term of this plan.	Kiwi Recovery Group	Medium
6.5 Communicate national issues, new ideas, new technologies and updated best practice to kiwi stakeholders on a regular basis (through the annual kiwi hui, species and regional group leaders and other means).	Kiwi Recovery Group; Kiwis for kiwi	Essential
6.6 Fill key gaps in advisory resources as identified throughout the term of this plan.	Kiwi Recovery Group; Kiwis for kiwi	Medium

5.1.7 Topic 7 – Planning and coordination for regional, species or topic-focused working groups

The national scale of kiwi recovery means that further coordination of work needs to occur at a regional, species or whānau/hapū/iwi level. This need also exists for some topics that cover a wide geographic spread and require the input of many specialised stakeholders and practitioners (e.g. threat of dogs, acoustic recorder development, kiwi genetics). Previously, this coordination has been carried out through taxon groups and plans (e.g. Northland Kiwi Forum, taxon plans). These efforts have brought together individuals, groups and agencies in an organised fashion to tackle complex issues and progress kiwi and ecosystem recovery at a regional or species level.

Issues

Issue 7.1 There is limited coordination of partners for some regions/species, especially in the southern South Island.

Issue 7.2 There has been limited coordination for research and development topics that involve numerous stakeholders and practitioners, resulting in repetition of work, inefficient use of resources and inconsistencies.

Issue 7.3 Communication between regional/taxon groups, topic-based groups and the Kiwi Recovery Group is currently ad hoc.

Issue 7.4 Detail in the national Recovery Plan is not sufficient to guide implementation at the regional/species level.

Issue 7.5 The original taxon plan template and development process was too onerous and required too much resource for many groups.

Objectives

Objective 7.1 To effectively use species/regional and topic-based plans that address relevant issues at a more detailed level for kiwi recovery.

Objective 7.1 To ensure strong communication and links between species/regional and topic-based groups and the Kiwi Recovery Group.

Objective 7.1 To support collaboration of mana whenua, community, government and non-governmental organisations in kiwi conservation.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/ AFFECTED GROUPS)	PRIORITY
7.1 Revise the template for species and regional (formerly 'taxon') plans so that they are concise and fit for purpose.	Kiwi Recovery Group	High
7.2 Update all species/regional plans with the revised template by 2021 so they are up-to-date and fit the current Recovery Plan.	Regional and species groups	Essential
7.3 Support topic-based groups that address high-priority issues (e.g. genetics)	Kiwi Recovery Group; (Kiwis for kiwi)	High
7.4 Support species/regionally-focused groups, to encourage collaborative achievement of local and species goals.	Kiwi Recovery Group; regional and species groups; Kiwis for kiwi	Medium
7.5 Communicate regularly between the Kiwi Recovery Group and regional, species and topic-focused groups to ensure information flow and support.	Kiwi Recovery Group; (Kiwis for kiwi; DOC Biodiversity; DOC Operations)	Medium

5.1.8 Topic 8 – DOC-led kiwi projects

DOC has a statutory responsibility to maintain and restore New Zealand's natural heritage. It manages a third of New Zealand's land area, which includes approximately 70% of the current kiwi distribution. DOC also has a significant proportion of the technical expertise needed to undertake kiwi recovery efforts and support others to do the same.

In 2000, DOC established five kiwi sanctuaries (Whangarei, Moehau, Tongariro, Ōkarito and Haast) using Biodiversity Strategy funding. These sanctuaries provided ground-breaking knowledge about kiwi biology and responses to management. They also led to the development of management techniques and tools that have advanced the recovery of kiwi and other species throughout the country (e.g. Sky Ranger, 1080 prescriptions, strategies to deal with trap-oshy stoats). Work at the kiwi sanctuaries has nearly doubled the populations of the most critically endangered kiwi. Furthermore, these sanctuaries and the involvement of DOC has spurred and helped support the growth of community conservation projects in their regions.

Outside the kiwi sanctuary programme, DOC runs numerous large-scale programmes that benefit kiwi (e.g. Battle for our Birds) and manages offshore islands and significant areas of backcountry. Additional ongoing landscape-scale management and focused monitoring will be initiated over the next few years, supported by the new kiwi funds provided in the Save Our Iconic Kiwi bid, to turn the national decline of kiwi into an increase. Thus, DOC manages some of the largest and/or longest-standing kiwi projects in the country.

Issues

Issue 8.1 Collaboration and effective communication is needed between DOC business groups to maximise kiwi recovery outcomes.

Issue 8.2 Competing demand for DOC operating funds may have implications for some existing long-term kiwi management and monitoring projects.

Issue 8.3 The retention of institutional and local knowledge, as well as important skill sets is at risk or has been lost due to staff turnover.

Issue 8.4 DOC has responsibilities and obligations with Treaty Partners in line with Section 4 of the Conservation Act 1987.

Objectives

Objective 8.1 To support DOC kiwi projects as sites of successful management and learning.

Objective 8.2 To support the effectiveness of DOC kiwi projects by incorporating the expertise and resources from multiple DOC business groups through regular communication and review.

Objective 8.3 For DOC to support tangata whenua as their primary partners to be kaitiaki of kiwi within their rohe.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
8.1 Develop and implement an operational plan to ensure that DOC uses the Save Our Iconic Kiwi funding in a way that helps to meet the national recovery goals for kiwi.	DOC Operations; (DOC Biodiversity; Kiwi Recovery Group; Treaty Partners)	Essential
8.2 Maximise the synergies between DOC priority ecosystem and species projects with Save Our Iconic Kiwi priorities.	DOC Operations; (Kiwi Recovery Group; DOC Biodiversity)	High
8.3 Plan and review DOC kiwi recovery expenditures regularly (e.g. 3–5-yearly) with operational and science and technical staff.	DOC Operations; Kiwi Recovery Group; DOC Biodiversity	Essential
8.4 Support and proactively build relationships between DOC business groups and among DOC-led kiwi projects across DOC Districts and Regions.	DOC Operations; Kiwi Recovery Group; DOC Biodiversity	High
8.5 Support and proactively build relationships with whānau/hapū/iwi to ensure section 4 responsibilities are met.	DOC Operations; DOC KKA	Essential

5.1.9 Topic 9 – Best practice for kiwi management

The primary basis for creating best practice around kiwi management is to ensure the welfare of birds as required by the Animal Welfare Act, 1999. Over the years, a tremendous amount of information on best practice in kiwi management has been developed, which is mainly summarised in the Kiwi Best Practice Manual^{20, 21}. The Kiwi Best Practice Manual is referred to in the conditions listed on Wildlife Act Authorities (e.g. for permits to handle kiwi) and is a key reference available to kiwi practitioners on minimum standards and methodologies for handling kiwi.

Issues

Issue 9.1 As technologies and protocols change and progress, they need to be assessed and included in the Kiwi Best Practice Manual, with all updates communicated widely.

Issue 9.2 Not all kiwi practitioners know that the Kiwi Best Practice Manual exists or how to access it.

Issue 9.3 Permits are inconsistent in their inclusion of the Best Practice Manual standards and the ability to cross-reference with the Accredited Handlers Database.

Issue 9.4 Breaches of best practice standards are rarely followed up.

Issue 9.5 The Kiwi Best Practice Manual needs to meet the needs of kiwi practitioners.

Issue 9.6 The Kiwi Accredited Handler and Conservation Dog Handlers databases are managed in isolation from similar databases (e.g. Bird Banding Office) and are not readily accessible to DOC Permissions and Operational staff.

Objectives

Objective 9.1 To undertake kiwi management at a consistently high standard.

Objective 9.2 To effectively communicate and implement best practice.

Objective 9.3 To ensure that the Kiwi Accredited Handlers database is accessible and managed sustainably.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
9.1 Revise the Kiwi Best Practice Manual annually.	Kiwi Recovery Group (kiwi practitioners; mana whenua)	Essential
9.2 Create a Kiwi Best Practice Committee to update the manual annually.	Kiwi Recovery Group (mana whenua)	High
9.3 Ensure that kiwi practitioners are trained and remain current on best practice standards.	DOC Operations; DOC Biodiversity; Kiwis for kiwi; (mana whenua)	High
9.4 Refer to and monitor the use of best practice through local permit systems.	DOC Operations	Medium

5.1.10 Topic 10 – Translocations

Translocations, which are defined as the human-mediated movement of living organisms from one area with release in another, are covered by the International Union for Conservation of Nature (IUCN) Reintroduction Guidelines (IUCN 2013). Translocation is one tool that helps to meet some of our national recovery goals. It allows for the genetic management of isolated populations, and the restoration or rapid increase of kiwi numbers at sites where natural re-population would be impossible, difficult or likely to lead to genetic issues in a severely bottlenecked population. Furthermore, translocations are a critical component of other tools, such as ONE and kōhanga kiwi.

As with some of these other tools, translocations should support and supplement a long-term programme of active predator management to protect kiwi in the wild. Genetic considerations are key, as a re-introduction in effect is creating a population with a man-made bottleneck, and so founding populations need to account for this with sufficient diversity from good stock. As an additional side benefit, translocations often provide opportunities for advocacy.

Types of translocations:

Re-introduction: the intentional movement and release of an organism inside its indigenous range from which it has disappeared

Supplementation: the intentional movement and release of an organism into an existing population of conspecifics

Assisted colonisation: the intentional movement and release of an organism outside its indigenous range to avoid extinction of populations of the focal species.

Issues

Issue 10.1 Nationally, there is a lack of strategic direction for kiwi translocations.

Issue 10.2 There is a lack of understanding from some kiwi recovery practitioners, managers and partners about the costs and complexity of translocations, including the relevant ecological, biological (e.g. genetics, disease) and animal welfare considerations.

Issue 10.3 There is a lack of understanding of tikanga and whānau, hapū and iwi involvement in relation to translocations. Consultation efforts are often insufficient.

Issue 10.4 Monitoring and reporting on the effectiveness of translocations is inconsistent.

Issue 10.5 Translocations will not address the significant declines occurring due to insufficient management.

Issue 10.6 Translocations are costly and may not be as effective in the long term as a similar investment in *in situ* management.

Objective

Objective 10.1 To undertake kiwi translocations using a consistent and strategic approach with high rates of success.

Objective 10.2 To avoid new translocations where they are not the right tool for meeting species goals (e.g. Fiordland tokoeka and great spotted kiwi).

Objective 10.3 Tangata whenua involvement in translocations is increased.

Objective 10.4 To clearly measure and understand the effectiveness of translocation as a management tool.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
10.1 Adequately record translocations, and measure, report and lodge their outcomes in the DOC translocation database.	DOC Operations; (DOC Biodiversity; Kiwi translocation practitioners; mana whenua)	High
10.2 Update the review of kiwi translocations carried out thus far to determine the rates of success and failure, as well as the factors that influence outcomes.	Kiwi Recovery Group; (external researchers)	Medium
10.3 Develop a national kiwi translocation strategy to guide future releases, including where translocations would be an inappropriate tool.	Kiwi Recovery Group; tangata whenua	Essential
10.4 Identify and pursue opportunities to further upskill kiwi practitioners and DOC staff advising on translocations in terms of the biological aspects, cultural requirements and tikanga for translocations.	Kiwi Recovery Group; Kiwis for kiwi; DOC	High

5.1.11 Topic 11 – Kōhanga kiwi/translocated source site populations

Translocated source site populations, or kōhanga kiwi, should be managed to meet key recovery goals by maximising the sustainable harvest of subadult or adult kiwi to establish or supplement natural wild populations with no genetic loss²². Several translocated source site/kōhanga kiwi populations have been established over the past decade both intentionally and by chance. Current kōhanga kiwi sites should continue as sources of kiwi for translocation, provided that resources are available for this, and that sound genetic, disease and safe handling standards can be met²². However, consideration needs to be given to the fact that establishing and harvesting from a kōhanga kiwi site results in translocated populations that have gone through a double genetic bottleneck (i.e. one bottleneck to create the kōhanga kiwi and a second one by using a subset of the kōhanga kiwi birds to create a new translocated population). Therefore, it is likely that wild-to-wild transfers will also be required.

In addition, a recent review of kōhanga kiwi programmes in New Zealand suggested that the setup of these sites comes at a high cost and so, due to the time investment needed to become productive, this investment may not be as effective in the long term as a similar investment in *in situ* management, especially considering the fast pace of predator control development. The protection of large and diverse natural populations that provide a more robust genetic source for founding new populations is the most cost-efficient and biologically advantageous method to found or supplement populations at other sites²². Therefore, to reach the new goals for kiwi recovery nationally, the focus will be on keeping existing kōhanga kiwi sites and ensuring they are well managed, with careful consideration being given to the establishment and use of any new fenced or island sites.

Issues

Issue 11.1 Kōhanga kiwi/ translocated source sites with a small geographic footprint may be too small to contain a genetically robust population and/or are difficult to harvest from cost-effectively.

Issue 11.2 Guidance is needed to maximise the efficient use and genetic management of current kōhanga kiwi source sites.

Issue 11.3 The time of harvest from a kōhanga kiwi site relates to the carrying capacity of the population, which is not well understood.

Objectives

Objective 11.1 To successfully manage genetically robust and numerically healthy source populations to found new or supplement existing populations.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
11.1 Maintain current designated kōhanga kiwi sites to ensure that they are managed to retain genetic diversity; this may include the periodic introduction of genetically unrelated kiwi, especially for smaller sites.	Kōhanga kiwi sites; Kiwi Recovery Group	Essential
11.2 Ensure that when kōhanga kiwi sites are harvested for translocation, the release sites meet the goals and requirements from the National Kiwi Translocation Strategy (Action 10.3) and regional kiwi recovery plans.	Kiwi Recovery Group; (DOC; kōhanga kiwi sites; Kiwis for kiwi)	Essential

5.1.12 Topic 12 – Operation Nest Egg (ONE)

Operation Nest Egg (ONE) is an intensive and costly, yet effective method that was originally developed in 1994 to rapidly build populations of critically endangered kiwi species by removing young birds from the presence of predators. It can be utilised for genetic management to capture rare alleles, supplement depleted populations and as a tool for metapopulation management. It can also be used to create new populations and has the additional benefit of being an excellent tool for engaging people with kiwi. While proven successful for brown kiwi and rowi, ONE is less effective for broad use with great spotted kiwi and tokoeka due to their biology (e.g. social structure of great spotted kiwi) and easily-stressed and flighty nature.

ONE has a component of intensive captive management and therefore has inherent disease risks. This requires ONE to be used strategically and strict implementation of health management protocols without which disease issues can threaten its ongoing success and that of associated crèche sites. Stress related to ONE and crèche management (e.g. high densities, re-use of pens and crèches, nutritional stress and handling) can affect immune function making kiwi more vulnerable to parasites and infectious disease. Long-term build-up of parasites in the environment and development of drug resistance could ultimately result in the need to abandon infected areas (e.g. crèche sites). Furthermore, although long-term success will require the management of pests in the release habitat, the sole use of this tool does not benefit the wider ecosystem.

Issues

Issue 12.1 There is a lack of long-term strategic direction for ONE and how it supports brown kiwi recovery.

Issue 12.2 There is inconsistent reporting nationwide on the annual use of ONE as required by the national ONE translocation plan.

Issue 12.3 There is a need to shift towards *in situ* management or other methods for rowi and Haast tokoeka.

Issue 12.4 The disease incidence and mortality of chicks associated with some ONE and crèche sites must be addressed.

Issue 12.5 The true cost and value of ONE varies greatly between species and is difficult to calculate, thereby impacting on management decisions.

Objectives

Objective 12.1 To utilise the national ONE programme as an effective tool for kiwi recovery where appropriate.

Objective 12.2 To effectively manage rowi and Haast tokoeka *in situ*, except for the purposes of genetic rescue for unmanaged outlying populations.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
12.1 Consider ONE as part of the national kiwi translocation strategy.	Kiwi Recovery Group	Essential
12.2 Develop a long-term plan for rowi and Haast tokoeka, which moves towards less-intensive management, survival and reproduction in the wild. ONE will be used only where required for the genetic management of important unprotected populations.	Kiwi Recovery Group; DOC operational teams in Haast and Ōkarito	High
12.3 Renew the national ONE translocation plan to allow projects to undertake ONE across the country.	DOC Biodiversity; (DOC Operations)	Essential
12.4 Ensure consistent reporting of ONE throughout the country as required by the national ONE translocation plan.	DOC Operations; (DOC Biodiversity; Kiwi Recovery Group)	High
12.5 Develop crèche management protocols to minimise mortality and disease.	DOC Biodiversity; (Kiwi Recovery Group)	High

5.1.13 Topic 13 – Protecting kiwi within the production landscape

Kiwi can and do live in forest remnants on farmland, in exotic production forests and in areas planned for mining. This land may be owned or managed by the Crown, corporations, Māori and other groups or individuals. In these areas, the production needs and aspirations of people may come into conflict with what is in the best interests of kiwi. However, with adequate guidance statutory authorities, landowners, managers and Māori trustees can better address any threats to kiwi.

Issues

Issue 13.1 Threats to kiwi in the production landscape are greater than those in indigenous forests, as they include both the standard threats (predators in particular) and the additional threats of fire, machinery, habitat loss and excavation.

Issue 13.2 There is currently a lack of consistent guidance and support for managing kiwi in Māori, public and private exotic production forest, and in indigenous forest remnants on farmland.

Issue 13.3 Misperceptions may exist that kiwi protection cannot occur while also maintaining full production.

Objectives

Objective 13.1 To make kiwi management a key consideration within all production management practices.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
13.1 Provide information and support on kiwi protection and mitigation measures to forestry and mining companies, farming and horticulture certifying bodies, land owners and managers, company managers and Māori Trusts.	Kiwis for kiwi; DOC Operations; DOC Biodiversity	Medium
13.2 Include the statutory protection of kiwi and their habitat in district plans (same as Action 14.1).	DOC Operations; (regional and district councils)	High
13.3 Provide information on kiwi distribution and priority areas for management to local authorities, landowners and managers (same as Action 14.2).	DOC Operations	Medium
13.4 Increase opportunities for kiwi protection through incentives, rules and conditions in planning processes.	DOC Operations	Medium
13.5 Recognise kiwi protection efforts and successes in production areas through media and sector channels.	Kiwis for kiwi; (DOC Communications Team)	Medium

5.1.14 Topic 14 – Kiwi protection in the urban and rural environment

In some towns and settlements in New Zealand, kiwi live in people’s backyards. Similarly, some kiwi areas are in the rural-urban transition landscape, which is being subdivided for lifestyle and residential development or where people holiday. Kiwi can share the landscape with people and this proximity offers opportunities for people to actively protect ‘their kiwi’. There are challenges though, as pets also often inhabit the landscape and can prey on kiwi.

Issues

Issue 14.1 Predation of kiwi by domestic animals, particularly dogs and cats, is likely to increase with further land development.

Issue 14.2 Pet owners pose a risk when bringing pets on holiday in kiwi habitat (e.g. holiday homes, boats on islands).

Issue 14.3 As kiwi populations grow in rural-urban transition areas, the risk of roadkill and predation by pets increases.

Objectives

Objective 14.1 To minimise threats to kiwi and their habitat in areas where kiwi habitat and human populations overlap.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
14.1 Include statutory protection of kiwi and their habitat in district plans (same as Action 13.2).	DOC Operations; (regional and district councils)	High
14.2 Provide information on kiwi distribution and priority areas for management to local authorities, land owners and managers (same as Action 13.3).	DOC Operations; DOC Biodiversity (Kiwis for kiwi)	Medium
14.3 Continue to raise awareness of kiwi threats associated with land use and pet ownership, and how statutory planning and policy can support kiwi recovery.	DOC Operations	Medium
14.4 Develop a plan to minimise the transport of pets into kiwi areas (e.g. holiday home rentals, islands).	Kiwis for kiwi	Medium

5.2 Engaging people with kiwi and their recovery

5.2.1 Topic 15 – Tangata whenua

Māori have a strong connection to the natural environment, which leads to the development of mātauranga (knowledge) and understanding. The Māori world view shapes this mātauranga and the use of mātauranga shapes tikanga. Māori as kaitiaki are restricted and governed by tikanga, which influences the ways in which Māori manage their natural resources so that the mauri is balanced. An example is the concept of rāhui, whereby designated areas are temporarily restricted from use to allow the resources to rejuvenate or because they have become tapu (sacred) as the result of a death.

Kiwi are a taonga species to Māori. Tangata whenua have developed extensive mātauranga not only about kiwi, but also the ecosystems in which they reside. This knowledge pre-dates scientific knowledge and was generated from the first migrations to the present time. Many groups have and are contributing to the protection of kiwi, and active involvement in kiwi management maintains mātauranga which, in turn, strengthens the capacity of whānau, hapū and iwi to act as kaitiaki.

The involvement of tangata whenua in kiwi management is growing. Treaty settlements have strengthened the ability for some hapū and iwi to exercise kaitiakitanga over areas that are significant for kiwi recovery and kiwi management on Māori freehold land. This involvement is increasing, both in areas under kawenata and in productive landscapes. In 2011, Māori freehold land covered 1.4 million hectares, including 12% of the North Island²³. As the Māori economy continues to grow, there will be significant opportunities for tangata whenua to play a central role in kiwi recovery and existing Māori-led kiwi projects are likely to play a key role in realising this potential by demonstrating rangatiratanga and sharing mātauranga and tohungatanga.

Issues

Issue 15.1 There is currently a lack of adequate support to tangata whenua for establishing and managing ongoing projects and engaging on an equal footing with other partners (e.g. DOC, regional councils) over matters of kaitiakitanga for kiwi and their environment.

Issue 15.2 The capacity of whānau, hapū and iwi to undertake kiwi management is stretched due to conflicting obligations (e.g. sustaining marae, language revival, youth development, improving community health and employment, and engagement with local and central government).

Issue 15.3 Much of the current engagement with tangata whenua is not carried out in a way that allows all parties, including whānau, hapū and iwi, to play an active role in decision-making.

Issue 15.4 Mātauranga Māori is not widely understood, acknowledged or utilised.

Issue 15.5 There is a lack of understanding of tangata whenua values around kiwi and how those values are provided for under current legislation.

Issue 15.6 There is a need for opportunities to engage younger generations in kaitiakitanga and kiwi management.

Objectives

Objective 15.1 To ensure tangata whenua are actively involved in kiwi conservation through both iwi-led and co-managed projects and sites.

Objective 15.2 To ensure the role of tangata whenua as kaitiaki of kiwi is understood, acknowledged and incorporated into management plans and actions.

Objective 15.3 To ensure mātauranga Māori is understood and used in kiwi management.

ACTION	ACCOUNTABLE GROUPS (SUPPORTING/AFFECTED GROUPS)	PRIORITY
15.1 Provide project governance and management mentoring to help projects to establish and become sustainable.	DOC; Kiwis for kiwi; Ngā Whenua Rāhui (within kawenata areas or in collaboration with other parties)	High
15.2 For all kiwi practitioners, increase the understanding of western ecological principles and mātauranga Māori and the positive contributions they can both provide to kiwi management.	DOC; Kiwis for kiwi; Ngā Whenua Rāhui (within kawenata areas or in collaboration with other parties)	Essential
15.3 Provide accessible training for skills in predator control, kiwi monitoring, forest health monitoring, health and safety, etc. so that tangata whenua can exercise their roles as kaitiaki.	DOC Operations; DOC Biodiversity; Kiwis for kiwi; Ngā Whenua Rāhui (within kawenata areas or in collaboration with other parties)	Essential
15.4 Support connections between whānau, hapū and iwi to encourage whanaungatanga and mentoring.	DOC Operations; DOC Biodiversity; Kiwis for kiwi; Ngā Whenua Rāhui (within kawenata areas or in collaboration with other parties)	Essential
15.5 Increase awareness of tikanga that guides species management and understanding of the timeframes, roles and responsibilities involved for all kiwi practitioners.	Kiwi Recovery Group; Kiwis for Kiwi; Ngā Whenua Rāhui (within kawenata areas or in collaboration with other parties)	Essential
15.6 Increase opportunities for the cultural use of kiwi (e.g. feathers, bone), and add consistency and transparency to the process.	DOC Operations; Ngā Whenua Rāhui (within kawenata areas or in collaboration with other parties)	Essential
15.7 Explore how cultural harvest may be a part of kiwi management in the future.	Kiwi Recovery Group; Ngā Whenua Rāhui (within kawenata areas or in collaboration with other parties)	High

5.2.2 Topic 16 – Engagement and advocacy

Engagement and advocacy are important tools for engaging with local landowners or pet owners to encourage behavioural change (e.g. predator control, responsible dog ownership), and to build public and financial support for kiwi conservation. There are a variety of audiences, including children, landowners, community groups, DOC staff, hunters, dog owners, businesses, philanthropists, visitors to captive-rearing facilities and the general public. Different audiences will require different tools to ensure effective engagement with kiwi messages. This is a critical part of kiwi conservation and one of the areas that has seen the greatest growth over the past 25 years.

For our purposes, engagement is used as a generic, inclusive term to describe the broad range of interactions between people. It can include a variety of approaches, including (but not limited to) one-way communication or information delivery; building connectedness, empathy and emotional links; providing education/learning opportunities; increasing awareness and understanding; and empowering action in informal groups or formal partnerships.

Advocacy

Advocacy is a process whereby an individual or group aims to influence decisions within social systems and cultural spheres to bring about justice and positive change in environmental issues.

Engagement

Engagement refers to the process by which organisations and individuals build ongoing, permanent relationships to work towards a collective vision for the benefit of a community (e.g. kiwi).

Issues

Issue 16.1 There is a high demand by kiwi recovery practitioners and the public to connect with kiwi.

Issue 16.2 There is currently a lack of clarity around the goals of advocacy and engagement.

Issue 16.3 There is inconsistent use of advocacy and engagement tools.

Issue 16.4 Overall, minimal empirical research has been conducted on how kiwi advocacy and engagement affect conservation outcomes.

Issue 16.5 The impact of engagement and advocacy methods on animal welfare is not well understood.

Objectives

Objective 16.1 To effectively use advocacy and engagement to achieve clear conservation outcomes.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
16.1 Measure the conservation outcomes gained from using kiwi for advocacy to improve our understanding of its value to kiwi recovery.	Kiwi Recovery Group	High
16.2 Develop advocacy messages, tools and strategies to effectively meet kiwi engagement objectives, and make these widely available to practitioners.	Kiwis for kiwi; Kiwi Recovery Group	High
16.3 Empower and upskill practitioners and groups for effective engagement.	Kiwis for kiwi	High
16.4 Determine human engagement impacts on kiwi welfare and stress and incorporate into the Kiwi Best Practice Manual.	Kiwi Recovery Group (Kiwis for kiwi)	High

5.2.3 Topic 17 – Captive coordination and husbandry

The primary purpose of holding kiwi in captivity is for engagement and advocacy. In addition, by maintaining a numerically self-sustaining and genetically healthy population, captive facilities are also able to support targeted research, staff training and releases into managed wild sites, which directly benefit wild kiwi conservation. This population is maintained in facilities that model excellence in kiwi husbandry and animal welfare²⁴.

The captive brown kiwi programme has been actively coordinated since the early 2000s, with a studbook established in 1993. The population is still ‘phasing’ into a self-sustaining population of Eastern brown kiwi, with any remaining species and ESUs being gradually phased out. There is also a small captive population of brown kiwi in Europe and North America that is managed solely for advocacy.

Through visitation, captive facilities have the opportunity to communicate key kiwi conservation messages to approximately 2 million people each year. Through this, they highlight local *in situ* projects, explain how people can assist with conservation efforts and help raise funds for management in the wild.

Issues

Issue 17.1 There is pressure to balance display needs with the breeding of appropriate genetic pairs to maintain a sustainable captive population.

Issue 17.2 The captive programme’s potential to fully engage with advocacy and fundraising has not been fully reached.

Issue 17.3 There are ongoing issues with developing a palatable, standardised, captive diet that meets full nutritional requirements.

Objectives

Objective 17.1 To maintain a kiwi captive population that is at least numerically self-sustaining, demographically stable and genetically healthy in facilities that model excellence in kiwi welfare.

Objective 17.2 To ensure the programme effectively delivers key engagement and advocacy messages.

Objective 17.3 To produce healthy and robust kiwi for release to aid the recovery of kiwi in the wild.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
17.1 Ensure the continuation of Best Practice Species Management and the national captive programme.	Zoo Aquarium Association (ZAA); Kiwi Captive Coordinator	Essential
17.2 Review and rewrite guiding documents to ensure that they are relevant and up to date (e.g. Captive Management Plan, Brown Kiwi Husbandry Manual).	Kiwi Captive Coordinator; ZAA Husbandry Advisor	Essential
17.3 Incorporate nationally consistent messages and recommendations at a local level and ensure that captive facilities understand their primary role is engagement and advocacy.	Captive facilities; (ZAA Engagement Specialist Advisory Group; Kiwi Recovery Group)	High
17.4 Complete trials and roll out national use of the 'ZAA/Massey Kiwi Maintenance Diet' throughout all captive facilities.	ZAA Kiwi Husbandry Advisor; (Massey University and Kiwi Captive Coordinator)	High

5.3 Research

5.3.1 Topic 18 – Research planning

Kiwi recovery has benefited greatly from research and development, which has furthered our understanding of kiwi biology, allowed us to monitor changes in populations, and created tools for more cost-efficient and effective management. This research has not only revolutionised our understanding of kiwi biology and how to carry out kiwi management but has also had numerous flow-on benefits for other species. Like many other aspects of kiwi recovery, research has been carried out by a diverse group of stakeholders, including universities, DOC, Crown research organisations, wānanga and private enterprises.

Issues

Issue 18.1 National research needs are not regularly communicated to researchers.

Issue 18.2 There is often a lack of communication between researchers working on similar topics.

Issue 18.3 Research results sometimes fail to reach kiwi practitioners and managers on the ground in a timely or easily understandable way.

Objectives

Objective 18.1 To understand and communicate key research needs for kiwi recovery.

Objective 18.2 To maintain a strong collaboration between researchers, managers and kiwi recovery practitioners in order to improve our understanding of kiwi biology, ecology and conservation.

Objective 18.3 To support opportunities to utilise kaupapa Māori research.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
18.1 Develop a national research portfolio that identifies prioritised research needs for kiwi and is communicated regularly to the research community. Ensure that one member of the Kiwi Recovery Group is accountable for this portfolio.	Kiwi Recovery Group	High
18.2 Support the coordination of task force groups to deal with major research gaps in order to facilitate communication and collegiality between researchers and practitioners. (See also action 7.3.)	Kiwi Recovery Group	High
18.3 Maintain a database of all published kiwi research and make this accessible.	Kiwi Recovery Group (Kiwis for kiwi)	Medium
18.4 Identify datasets and research projects that have been carried out within DOC but still require analysis and write-up. Communicate these research needs to the academic community for assistance with completion.	Kiwi Recovery Group	Medium

5.3.2 Topic 19 – Life history and population demographics of kiwi

The majority of published research on kiwi biology, ecology and conservation has focused on North Island brown kiwi, and so the life history and demographics of this species are now relatively well understood. By contrast, less research has been published for other species, especially those in the South Island and on Stewart Island/Rakiura. Although some projects have improved our understanding of the life history of great spotted kiwi, rowi, Haast tokoeka and Northern Fiordland tokoeka, most of this work is not widely available or written up. This makes it difficult to determine how best to manage these populations, measure their response to management or predict future population growth, especially for new staff who may lack historic knowledge. In particular, there is a gap in our knowledge for Southern Fiordland tokoeka and for population trends of Rakiura tokoeka.

Issues

Issue 19.1 There are gaps in our knowledge about the biology, life history, population trends and/or responses to management of kiwi, especially for Southern Fiordland tokoeka and Rakiura tokoeka.

Issue 19.2 There are existing data that have not been analysed or published but may help to improve our understanding of kiwi life histories and population demographics.

Issue 19.3 It can be difficult to study South Island species due to their low-density populations, access issues and cost.

Objectives

Objective 19.1 To clearly understand the life histories and population demographics of all kiwi species and that the information is published.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
19.1 Analyse and publish existing data to identify research needs and incorporate the findings into management.	Researchers; DOC Biodiversity	High
19.2 Determine the current state and management needs of Stewart Island/Rakiura tokoeka and implement as required.	DOC Operations (DOC Biodiversity; Manaaki Whenua Landcare Research)	High
19.3 Collect baseline data and measure responses to management to model the population dynamics of great spotted kiwi and tokoeka in Fiordland (overlaps with Actions 1.2 and 4.4).	DOC Biodiversity (DOC Operations)	Essential

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
19.4 Collaborate with research providers to improve our understanding of the ecology and behaviour of all kiwi species.	Researchers; DOC Biodiversity; DOC Operations	Medium

5.4 Growing and sustaining the kiwi conservation effort

Kiwi conservation has been carried out for over 25 years and has made great gains. Although the aim of this Recovery Plan is to continue to grow the conservation effort to allow us to restore kiwi populations nationally, it is also critical that any gains made are sustainable in the long-term, which requires sustainability of people, groups, knowledge, funding and support structures, and ongoing pest control when eradication is not an option.

5.4.1 Topic 20 – People and groups

Tackling the goals of this recovery plan require the long-term efforts of many people, groups, organisations and whānau/hapū/iwi. If these efforts are not sustainable in the long term, hard-fought gains made will be lost. Planning and preparation to help maintain the people and groups doing conservation work will ensure ongoing survival of kiwi.

Issues

Issue 20.1 It is difficult for whānau/hapū/iwi, community conservation groups and DOC projects that have been carrying out work for many years to maintain their momentum in terms of effort and expertise.

Issue 20.2 Many projects (DOC, community and tangata whenua) are driven by a few highly motivated individuals, the loss of whom can be devastating to the project or organisation and to the kiwi work they do.

Issue 20.3 Some projects focus largely on the work they need to do, lacking the capacity or desire to engage with the broader kiwi conservation programme.

Issue 20.4 There is a heavy reliance on volunteers for critical ongoing aspects of project management.

Issue 20.5 Some projects and organisations are not structured or planning for long-term organisational health (e.g. governance, recruitment, training, retention, succession planning and resourcing).

Objectives

Objective 20.1 To ensure that projects and organisations are healthy, making their kiwi conservation work sustainable in the long term.

Objective 20.2 To establish new kiwi projects in target areas where they can meet priority needs for kiwi.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
20.1 Build capability to plan and prepare for long-term organisational health through opportunities such as the annual kiwi hui, new plans and regional forums.	Kiwis for kiwi; Kiwi Recovery Group	Essential
20.2 Provide opportunities for projects to network, share information, access technical expertise/advice/mentoring and connect to the national programme.	Kiwi Recovery Group; Kiwis for kiwi	Essential
20.3 Recognise the efforts of kiwi practitioners and agencies, whānau/hapū/iwi and communities, and celebrate their achievements and successes.	All	Medium

5.4.2 Topic 21 – Mātauranga/knowledge

Good management requires a solid foundation of knowledge and mātauranga Māori to base decisions around. It is critical that this knowledge is easily accessible and protected for the long term.

Issues

Issue 21.1 Some practitioners are unclear on how to access the knowledge, training and technical support that is needed for good decision-making and management.

Issue 21.2 Irreplaceable knowledge and skills are at risk of being lost as a result of high rates of staff/volunteer turnover.

Issue 21.3 A large amount of scientific and traditional knowledge about kiwi and their management is not readily available to the wider kiwi conservation community.

Issue 21.4 There is often a lack of capacity for the technical experts and approved trainers that are needed to support projects, people and organisations.

Issue 21.5 To stay strong, mātauranga Māori requires people to have hands-on experience of kaitiakitanga and access to kiwi materials. Therefore, the alienation of people from the land and the limited availability of cultural materials are significant challenges.

Issue 21.6 The lack of visibility and acknowledgement of mātauranga hinders the involvement of whānau, hapū and iwi as they do not see themselves as having a role in pure conservation efforts.

Objectives

Objective 21.1 To acknowledge mātauranga Māori for kiwi conservation.

Objective 21.2 To retain necessary knowledge for kiwi conservation over the long term and ensure this is readily available to all practitioners.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
21.1 Disseminate kiwi research, findings and knowledge so that they are shared with the wider community (e.g. publications, reports, media, hui).	Kiwis for kiwi; Kiwi Recovery Group; (DOC Biodiversity; DOC Operations; kiwi researchers)	Essential
21.2 Provide projects with high-quality technical advice and support and make groups aware of how to access this support.	Kiwi Recovery Group; Kiwis for kiwi; DOC Biodiversity	Essential
21.3 Provide relevant training opportunities for kiwi practitioners.	Kiwis for Kiwi; DOC Operations; DOC Biodiversity; Kiwi Recovery Group	High
21.4 Investigate how mātauranga Māori could be utilised for kiwi conservation.	Mana whenua; Manaaki Whenua Landcare Research	Essential

5.4.3 Topic 22 – Funding

Financial resources are directly related to the ability to carry out management on the ground. Struggles to obtain necessary funding and uncertainty about long-term availability of funding put many projects at risk of collapse.

Issues

Issue 22.1 Additional funding above what has initially been committed will be required to achieve the key goal of this plan as well as ensuring existing kiwi management continues.

Issue 22.2 Funding agencies often fund new projects more readily than for long-term existing projects and are less likely to fund administration and management costs.

Issue 22.3 Short-term funding cycles limit the ability of groups to plan for the long term and create extra work for projects.

Issue 22.4 Some groups lack the capability and/or capacity to manage funding applications and the reporting requirements of their projects.

Issue 22.5 There is a high risk that the gains made by long-term DOC and community projects will be lost as priorities and funding pressures change over time.

Issue 22.6 As the number of projects grows, competition for funding increases.

Objectives

Objective 22.1 To sufficiently resource and support all necessary kiwi conservation work.

ACTION	ACCOUNTABLE GROUP (SUPPORTING/AFFECTED GROUPS)	PRIORITY
22.1 Develop strategies to properly resource the achievement of this plan's strategic goal of a 2% increase in kiwi.	Kiwis for kiwi; DOC Operations; DOC Biodiversity; DOC Partnerships; (Forest & Bird)	Essential
22.2 Advocate to funding agencies the need to recognise and fund all project aspects, including administration and management, and the importance of multi-year funding.	Kiwis for kiwi; (DOC Operations; DOC Partnerships; DOC Biodiversity)	High
22.3 Investigate the economies of scale for purchasing equipment and services that can be coordinated from a national perspective.	Kiwis for kiwi; (DOC Operations)	Medium
22.4 Provide workshops, training opportunities and mentorship to help empower whānau/hapū/iwi and community groups.	Kiwis for kiwi; (DOC Operations; DOC Biodiversity; DOC KKA)	Essential
22.5 Reduce the administrative burden associated with funding applications and reporting for projects through collaboration with funding agencies.	Kiwis for kiwi	Medium

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Appendix 1

Te Reo Glossary

Aotearoa: New Zealand; long white cloud.

Hapū: subtribe.

Hui: an assembly, gathering or meeting.

Iwi: tribe.

Kaitiaki: trustee, guardian or steward.

Kaitiakitanga: Guardianship, stewardship, protection and enhancement of all things on and within the environs of whenua (land) and moana (sea).

Kawenata: covenant.

Mahi: work.

Mana whenua: territorial rights, power associated with possession and occupation of tribal land; used to refer to the indigenous people at place.

Mātauranga: knowledge, wisdom, understanding, skill.

Mauri: the life principle or vital essence of a being or entity.

Rāhui: to put in place a temporary ritual prohibition, closed season, ban, reserve.

Rakiura: Stewart Island.

Rangatiratanga: the right to exercise authority; self-determination; self-management.

Tangata whenua: people of the land; local people, indigenous people – people born of the whenua, i.e. of the placenta and of the land where the people’s ancestors have lived and where their placenta are buried; used to refer to Māori people as a whole.

Taonga: an object or natural resource that is highly prized; a treasure.

Tapu: sacred, prohibited, restricted, set apart, forbidden.

Te Ao Māori: the Māori world. This includes te reo (the language and dialects), tikanga (the processes and practices), marae (the community focal point), wāhi tapu (sites of importance) and access to whānau, hapū and iwi

Te Tai Tokerau: Northland.

Tikanga: correct procedure, custom, habit, lore, method, manner, rule, way, code, meaning, plan, practice, convention, protocol; the customary system of values and practices that have developed over time and are deeply embedded in the social context.

Tino rangatiratanga: self-determination, sovereignty, autonomy, self-government, domination, rule, control, power.

Tohungatanga: expertise, competence, proficiency.

Whakapapa: genealogy; the process of laying one thing upon another.

Whānau: extended family or family group.

Whanaungatanga: a relationship through shared experiences and work together which provides people with a sense of belonging.

Appendix 2

Associated strategic directives

Treaty of Waitangi

Section 4 of the Conservation Act 1987 clearly requires DOC to ‘give effect to the principles of the Treaty of Waitangi’, and DOC’s primary relationships are with the Crown’s Treaty partners. Therefore, DOC will achieve healthy partnerships with Māori and meet the Crown’s obligations to Māori under the Conservation Act 1987 by applying Treaty principles practically in its work.

For practical purposes, the Treaty principles that are most relevant to kiwi conservation are:

Partnership – mutual good faith and reasonableness

The Crown and Māori must act towards each other reasonably and in good faith. These mutual duties are the core of what has been described as the Treaty partnership.

Informed decision-making

Both the Crown and Māori need to be well informed of the other’s interests and views. When exercising the right to govern, Crown decision-makers need to be fully informed, while for Māori, full information needs to be provided in order to contribute to the decision-making process. This is connected closely to the principles of good faith and active protection. Consultation is a means to achieve informed decision-making.

Active protection

The Crown must actively protect Māori interests retained under the Treaty as part of the promises made in the Treaty for the right to govern. This includes the promise to protect tino rangatiratanga and taonga. Active protection requires informed decision-making and judgement as to what is reasonable in the circumstances.

Redress and reconciliation

The Treaty relationship should include processes to address differences of view between the Crown and Māori. The Crown must preserve the capacity to provide redress for proven grievances from not upholding the promises made in the Treaty. Māori and the Crown should demonstrate reconciliation as grievances are addressed.

DOC’s statutory obligations

Under Section 6a of the Conservation Act 1987, DOC has the statutory obligation ‘to manage for conservation purposes, all land, and all other natural and historic resources’. Under the Wildlife Act 1953, kiwi are absolutely protected, meaning that no one may kill or have them in their possession unless they have a permit.

DOC’s strategic direction: outcomes framework and stretch goals

DOC is committed to working towards an outcome framework, where the focus is on the outcomes it wants to achieve (the results) rather than the outputs (tasks). DOC has one overall outcome, which is:

New Zealanders gain environmental, social and economic benefits from healthy functioning ecosystems, from recreation opportunities, and from living our history.

To achieve this, there are four intermediate outcomes focusing on natural heritage, historic heritage, recreation and engagement. For natural heritage, the intermediate outcome is:

The diversity of our natural heritage is maintained and restored.

This intermediate outcome is supported by six specific objectives that clarify what needs to happen to achieve it. The intermediate outcome objectives that apply to kiwi conservation are:

- A full range of New Zealand's ecosystems is conserved to a healthy functioning state (1.1)
- Nationally threatened species are conserved to ensure persistence (1.2)
- Nationally iconic species are managed to ensure their populations are maintained or restored (1.4)
- Locally treasured natural heritage is maintained or restored as partnerships (1.5)
- Public conservation lands, waters and species are held for now and future generations (1.6)

The aim is to achieve these in the next 25 years (by 2040).

DOC has also identified seven stretch goals linked to the intermediate outcomes to focus its efforts on for the next 10 years (by 2025). The stretch goals that apply to kiwi conservation are:

- 90% of New Zealanders' lives are enriched through connection to our nature
- Whānau, hapū and iwi are able to practise their responsibilities as kaitiaki of natural and cultural resources on public conservation lands and waters
- 50% of New Zealand's natural ecosystems are benefitting from pest management

Actions from this plan and how they fit within DOC's strategic direction can be found in Appendix 7.

Save Our Iconic Kiwi (SOIK) Treasury bid

The challenge posed by the Government is to turn the decline of unmanaged populations of kiwi from a 2% loss per year into a 2% gain per year across all taxa. The 2015 Budget allocated an additional \$11.2 million over the 4 years from 2015 to 2019, with a promise of an ongoing input of \$6.8 million thereafter to reverse the existing declines. At year 4, \$1.25 million of the ongoing \$6.8 million per annum will be dedicated to Kiwis for kiwi to allocate support to ongoing and new community-led kiwi conservation initiatives. The remaining funding (\$5.55 million per annum) will go towards DOC kiwi operations and monitoring.

Appendix 3

Definitions and abbreviations

BG: Biodiversity Group; DOC business group that deals with the scientific, technical and strategic side of aquatic and terrestrial ecosystems/species, addressing threats (e.g. predators, biosecurity) and monitoring and planning.

Crèche: A predator-free site where kiwi chicks are raised until they reach a stoat-safe weight and can be released to the wild.

DOC: New Zealand Department of Conservation.

Evolutionarily significant unit (ESU): a subpopulation that is not a result of human-induced fragmentation and that has a degree of genetic distinctiveness but is not differentiated enough to warrant being described as a species or subspecies (e.g. Coromandel North Island brown kiwi).

Ex situ: Conservation activities that involve removing a species from its natural setting.

Extirpation: the condition of a species (or other taxon) that ceases to exist in the chosen geographic area of study, though it still exists elsewhere.

Genetic bottleneck: a sharp reduction in the size of a population due to environmental events or human activities; also known as a population bottleneck.

In situ: Conservation activities that take place where the species naturally occurs in the wild.

Isolation by distance: A genetic pattern observed in kiwi and some other species where a lack of gene flow across the entire population results in individuals that are closer to each other spatially being more genetically similar, while those that are further apart spatially are more genetically distinct.

Kiwis for kiwi Trust: A national charitable Trust that supports community-led and iwi-led kiwi conservation projects by raising and distributing funds, raising awareness and providing on-the-ground support.

Kōhanga kiwi: Kiwi sites (often artificially started by translocation) such as fenced sanctuaries and islands with very low or no predator impacts, where kiwi populations can be grown rapidly towards carrying capacity and from which subadult or adult kiwi can be harvested to establish or supplement wild populations.

Ngā Whenua Rāhui: a programme that supports the protection of the natural integrity of Māori land and to help preserve mātauranga Māori (traditional knowledge), so that the values, stories and history associated with natural taonga (treasures) are not lost to the world.

ONE (Operation Nest Egg): An *ex situ* management technique that removes kiwi chicks from predators during their most vulnerable time of life. This entails removing eggs or chicks from the wild, raising chicks in a captive environment or a predator-free crèche site until they have reached a stoat-safe weight (c. 1 kg), when they can be returned to the wild. It often increases the chance of survival to adulthood from c. 5% to 60%.

Predator Free New Zealand 2050 (PF2050): a private limited company formed in November 2016 by the New Zealand Government via the Department of Conservation to realise New Zealand's Predator Free 2050 goal. The company invests \$5 million per year in large landscape-scale projects and scientific research and leverages new funding to rid New Zealand of introduced pests, particularly mammalian predators (e.g. possums, rats and stoats).

Save Our Iconic Kiwi (SOIK): 2015 Budget allocation of an additional \$11.2 million over the 4 years from 2015 to 2019, with a promise of an ongoing input of \$6.8 million thereafter to reverse the existing kiwi declines.

Sky Ranger: A system for aerially monitoring wildlife transmitters that is integrated with a PC-based project management database.

Taxon (plural – taxa): any entity at the rank of species or subspecies which is formally named (e.g. Rakiura tokoeka, *Apteryx australis lawryi*) or putative and not yet formally described (tag named, e.g. Haast tokoeka, *Apteryx australis* “Haast”).

Translocation: the human-mediated movement of living organisms from one area with release to another; includes re-introductions, supplementation and assisted colonisation.

Viable: capable of living, developing, or reproducing.

Zoo Aquarium Association (ZAA): the association that represents affiliated captive facilities in the Australasian region.

Appendix 4

Isolation by distance

Contributed by Helen Taylor and Kristina Ramstad

Isolation by distance is an important concept in kiwi conservation genetics. Being territorial and flightless, kiwi have relatively stable home ranges and, as far as we know, do not range far outside these on a regular basis. Less is known about juvenile dispersal distance, but this too is limited relative to birds that fly. This limited dispersal means that there is a limit to the distance that genetic material from one bird can mix with genetic material from another bird. This lack of gene flow across the entire population results in a pattern known as isolation by distance, whereby birds that are closer to each other spatially will be more genetically similar, while those that are further apart spatially will be more genetically distinct (Fig. A4.1).

Understanding the phenomenon of isolation by distance is important to maintain genetic diversity through appropriate conservation measures. If we mixed geographically distant birds (either in their original populations or in a newly founded population), we would risk homogenising the genetic diversity found in the species as a whole. Maintaining genetic diversity within species is crucial to maximising the adaptive potential of species and makes them more resilient to challenges over the long term, such as their responses to new diseases and to the effects of climate change. Thus, if a population or species exhibits isolation by distance, it is important to maintain this pattern when managing the species.

Isolation by distance is known to occur in great spotted kiwi and rowi and is likely to occur in all kiwi species at different spatial scales. Research is underway to improve our understanding of what drives and maintains this structure, and how it can be applied to management.

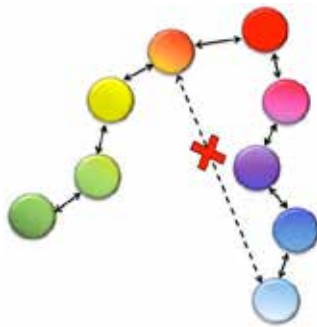


Figure A4.1. Schematic diagram of isolation by distance. Each circle represents a kiwi, the solid arrows represent kiwi moving between locations and the colours represent genetic differences. Kiwi can move between adjacent locations and thus birds that are adjacent are genetically similar (a similar colour). Birds do not disperse far enough to travel or mate between non-adjacent locations (e.g. dashed line) and thus more distant birds are more genetically distinct (a very different colour). Moving birds between all the locations would homogenise the genetic diversity and key differences could be lost (mixing all the colours together to produce brown at every location).

Appendix 5

Relevance of recovery actions to individual kiwi taxa

ACTION (See main document for full description)		GREAT SPOTTED KIW	LITTLE SPOTTED KIW	ROWI	HAAST TOKOEKA	N. FIORDLAND TOKOEKA	S. FIORDLAND TOKOEKA	RAKIURA TOKOEKA	NI BROWN	NOT TAXON-SPECIFIC
1.1	Implement landscape-scale pest control									
1.2/ 4.4	Measure the response of South Island kiwi to management to determine optimal landscape-scale management (same as 4.4)									
1.3	Use multiple pest control tools to reduce resistance to any one method and ensure all predatory mammals that threaten kiwi are targeted									
1.4	Maintain sites to develop new tools									
1.5	Increase the scale and connectivity of protected habitat									
1.6	Develop and promote best practice predator control									
1.7	Secure pest-free islands and fenced sites									
1.8	Support predator-free Rakiura									
1.9	Test whether little spotted kiwi can survive on a pest-managed mainland site									
2.1	Develop and sustain collaborations for responsible dog ownership and control									
2.2	Increase interagency response capacity for addressing dogs that kill kiwi									
2.3	Engage people to reduce the dog threat to kiwi									
2.4	Refine avian avoidance methods and equipment for dogs									
2.5	Research options to minimise the impact of dogs									
2.6	Ensure permitting consistency for dogs on public conservation land									
2.7	Provide training to collect evidence suitable for prosecution when dogs kill kiwi									
3.1	Incorporate genetic principles into national strategies and management									
3.2	Develop a national genetic management plan for kiwi									
3.3	Publish the taxonomy of kiwi									
3.4	Clarify the role of hybrid and mixed provenance populations									
3.5	Create a database of genetic samples									
3.6	Support efforts to incorporate genetic technologies into kiwi management									
3.7	Ensure little spotted kiwi populations have sufficient founders									
3.8	Retain genetic diversity of unmanaged populations of Haast tokoeka									
4.1	Identify and fill national and regional survey information gaps, especially for South Island kiwi species									
4.2	Implement a long-term monitoring programme to determine whether the 2% gain goal is being met for each kiwi species									
4.3	Improve survey and monitoring tools									
4.5	Develop consistent systems for data comparison over time and space									
4.6	Collaboratively collect data and report on distribution and changes in the state of kiwi									
5.1	Develop and implement systems to curate historic, current and future priority kiwi data									
5.2	Appoint a kiwi data management role									

Continued on next page

Appendix 5 continued

ACTION (See main document for full description)		GREAT SPOTTED KIWI	LITTLE SPOTTED KIWI	ROWI	HAAST TOKOEKA	N. FIORDLAND TOKOEKA	S. FIORDLAND TOKOEKA	RAKIURA TOKOEKA	NI BROWN	NOT TAXON-SPECIFIC
6.1	Prepare biennial progress report for this recovery plan									
6.2	Review this recovery plan									
6.3	Review Kiwi Recovery Group membership									
6.4	Communicate Recovery Group purpose and work									
6.5	Communicate national issues, new ideas, new technologies and updated best practice									
6.6	Review resources for advice and fill key gaps									
7.1	Revise the template for species and regional (formerly 'taxon') plans									
7.2	Update all species and regional plans by 2021									
7.3	Support topic-based groups									
7.4	Support regional- and species-based groups									
7.5	Ensure connections between the Kiwi Recovery Group and regional-, species- and topic-based groups									
8.1	Implement a DOC operational plan for 2015 Budget funding with regular review to ensure on track									
8.2	Create synergies for DOC work with ecosystem and species management units									
8.3	Regularly plan and review major DOC kiwi expenditures by operational and science staff									
8.4	Support relationships between DOC-led kiwi projects and business groups									
8.5	Increase DOC support to and build relationships with whānau/hapū/iwi									
9.1	Regularly update the Kiwi Best Practice Manual									
9.2	Create a Kiwi Best Practice Committee									
9.3	Train practitioners on best practice standards									
9.4	Refer to and monitor best practice through permit systems									
10.1	Record translocations and their outcomes in the DOC translocation database									
10.2	Review kiwi translocations									
10.3	Write the national kiwi translocation strategy									
10.4	Upskill practitioners on translocation technical aspects and tikanga									
11.1	Retain genetic diversity at current kōhanga kiwi									
11.2	Ensure that kōhanga kiwi release sites meet goals and requirements from the National Kiwi Translocation Strategy									
12.1	Include ONE as part of the kiwi translocation strategy									
12.2	Develop long-term plans for managing rowi and Haast tokoeka in the wild									
12.3	Renew the national ONE translocation plan									
12.4	Ensure consistent reporting of ONE nationally									
12.5	Develop crèche management protocols									
13.1	Support protection in production landscapes									
13.2/ 14.1	Promote the inclusion of statutory protection of kiwi and their habitat in district plans (same as Action 14.1)									
13.3/ 14.2	Provide information on kiwi distribution and priority areas for management to local authorities (same as action 14.2)									
13.4	Increase opportunities for kiwi protection in planning processes									

Continued on next page

Appendix 5 continued

ACTION (See main document for full description)		GREAT SPOTTED KIWI	LITTLE SPOTTED KIWI	ROWI	HAAST TOKOEKA	N. FIORDLAND TOKOEKA	S. FIORDLAND TOKOEKA	RAKIURA TOKOEKA	NI BROWN	NOT TAXON-SPECIFIC
13.5	Recognise kiwi protection efforts and successes through media and sector channels									
14.3	Raise awareness of kiwi threats associated with land use and pet ownership									
15.1	Provide project governance and management mentoring to help projects to establish and become sustainable									
15.2	Increase understanding of tangata whenua around Western ecological principles used alongside mātauranga Māori									
15.3	Provide training for tangata whenua in predator control, kiwi and forest health monitoring, health and safety, etc.									
15.4	Support connection between whānau, hapū and iwi for whanaungatanga and mentoring									
15.5	Increase awareness of tikanga that guides species management									
15.6	Increase opportunities for the cultural use of kiwi									
15.7	Explore cultural harvest as a part of kiwi management									
16.1	Measure the conservation outcomes gained from advocacy opportunities using kiwi									
16.2	Develop advocacy tools and strategies to effectively meet kiwi engagement objectives									
16.3	Upskill kiwi practitioners on effective engagement									
16.4	Determine impacts associated with public engagement activities on kiwi welfare and stress; incorporate into best practice									
17.1	Continue best practice species management and the national captive management programme									
17.2	Review captive management guiding documents to ensure that they are relevant and up to date									
17.3	Ensure captive facilities understand their primary role in engagement/advocacy and that nationally consistent messaging is used									
17.4	Finalise 'ZAA/Massey Kiwi Maintenance Diet' and apply in all captive facilities									
18.1	Develop a national research portfolio and communicate to the research community									
18.2	Support the coordination of task force groups to deal with major research gaps									
18.3	Maintain a database of all published kiwi research									
18.4	Identify DOC datasets that require analysis and write-up									
19.1	Analyse and publish existing data									
19.2	Determine the state of Rakiura tokoeka and implement required management									
19.3	Improve collection of baseline data and responses to management for great spotted kiwi and Fiordland tokoeka									
19.4	Improve our understanding of the ecology and behaviour of all kiwi species									
20.1	Build capability to plan and prepare for long-term organisational health									
20.2	Provide kiwi practitioners opportunities to network, share information, mentor and connect to the national programme									
20.3	Recognise efforts and celebrate successes									
21.1	Support dissemination of kiwi research and knowledge									

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Appendix 5 continued

ACTION (See main document for full description)		GREAT SPOTTED KIWI	LITTLE SPOTTED KIWI	ROWI	HAAST TOKOEKA	N. FIORDLAND TOKOEKA	S. FIORDLAND TOKOEKA	RAKIURA TOKOEKA	NI BROWN	NOT TAXON-SPECIFIC
21.2	Provide projects with quality technical advice and support									
21.3	Provide training opportunities for kiwi practitioners									
22.1	Develop strategies to resource the kiwi recovery plan's strategic goal of a 2% increase in kiwi									
22.2	Advocate to funders the need for all project aspects and the importance of multi-year funding									
22.3	Investigate economies of scale that can be coordinated from a national perspective									
22.4	Provide workshops, training opportunities and mentorship to help empower whānau/hapū/iwi and community groups									
22.5	Collaborate with funders to reduce the administrative burden of applications and reporting									

Appendix 6

Timeline of recovery actions

ACTION (See main document for full description)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1.1	Increase landscape-scale pest control										
1.2/ 4.4	Measure the response of South Island kiwi to management to determine optimal landscape-scale management (same as 4.4)										
1.3	Use multiple pest control tools to reduce resistance to any one method and ensure all predatory mammals that threaten kiwi are targeted										
1.4	Maintain sites to develop new tools										
1.5	Increase the scale and connectivity of protected habitat										
1.6	Develop and promote best practice predator control										
1.7	Secure pest-free islands and fenced sites										
1.8	Support predator-free Rakiura										
1.9	Test whether little spotted kiwi can survive on a pest-managed mainland site										
2.1	Develop and sustain collaborations for responsible dog ownership and control										
2.2	Increase interagency response capacity for addressing dogs that kill kiwi										
2.3	Engage people to reduce the dog threat to kiwi										
2.4	Refine avian avoidance methods and equipment for dogs										
2.5	Research options to minimise the impact of dogs										
2.6	Ensure permitting consistency for dogs on public conservation land										
2.7	Provide training to collect evidence suitable for prosecution when dogs kill kiwi										
3.1	Incorporate genetic principles into national strategies and management										
3.2	Develop a national genetic management plan for kiwi										
3.3	Publish the taxonomy of kiwi										
3.4	Clarify the role of hybrid and mixed provenance populations										
3.5	Create a database of genetic samples										
3.6	Support efforts to incorporate genetic technologies into kiwi management										
3.7	Ensure little spotted kiwi populations have sufficient founders										
3.8	Retain genetic diversity of unmanaged populations of Haast tokoeka										
4.1	Identify and fill national and regional survey information gaps, especially for South Island kiwi species										
4.2	Implement a long-term monitoring programme to determine whether the 2% gain goal is being met for each kiwi species										
4.3	Improve survey and monitoring tools										
4.5	Develop consistent systems for data comparison over time and space										
4.6	Collaboratively collect data and report on distribution and changes in the state of kiwi										
5.1	Develop and implement systems to curate historic, current and future priority kiwi data										
5.2	Appoint a kiwi data management role										
6.1	Prepare annual progress report for recovery plan										
6.2	Review this recovery plan										
6.3	Review Kiwi Recovery Group membership										
6.4	Communicate Recovery Group purpose and work										
6.5	Communicate national issues, new ideas, new technologies and updated best practice										
6.6	Review resources for advice and fill key gaps										
7.1	Revise the template for species and regional (formerly 'taxon') plans										
7.2	Update all species and regional plans by 2021										
7.3	Support topic-based groups										
7.4	Support regional- and species-based groups										

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Appendix 6 continued

	ACTION (See main document for full description)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
7.5	Ensure connections between the Kiwi Recovery Group and regional-, species- and topic-based groups											
8.1	Implement a DOC operational plan for 2015 Budget funding with regular review to ensure work is on track											
8.2	Create synergies for DOC work with ecosystem and species management units											
8.3	Regularly plan and review major DOC kiwi expenditures by operational and science staff											
8.4	Support relationships between DOC-led kiwi projects and business groups											
8.5	Increase DOC support to and build relationships with whānau/hapū/iwi											
9.1	Update the Kiwi Best Practice Manual annually											
9.2	Create a Kiwi Best Practice Committee to update best practice annually											
9.3	Train practitioners on best practice standards											
9.4	Refer to and monitor best practice through permit systems											
10.1	Record translocations and their outcomes in the DOC translocation database											
10.2	Review kiwi translocations											
10.3	Write a national kiwi translocation strategy											
10.4	Upskill practitioners on translocation technical aspects and tikanga											
11.1	Retain genetic diversity at current kōhanga kiwi											
11.2	Ensure that kōhanga kiwi release sites meet goals and requirements from the National Kiwi Translocation Strategy											
12.1	Include ONE as part of the kiwi translocation strategy											
12.2	Develop long-term plans for managing rowi and Haast tokoeka in the wild											
12.3	Renew the national ONE translocation plan											
12.4	Ensure consistent reporting of ONE nationally											
12.5	Develop crèche management protocols											
13.1	Support protection in production landscapes											
13.2/ 14.1	Promote the inclusion of statutory protection of kiwi and their habitat in district plans (same as Action 14.1)											
13.3/ 14.2	Provide information on kiwi distribution and priority areas for management to local authorities (same as Action 14.2)											
13.4	Increase opportunities for kiwi protection in planning processes											
13.5	Recognise kiwi protection efforts and successes through media and sector channels											
14.3	Raise awareness of kiwi threats associated with land use and pet ownership											
15.1	Provide project governance and management mentoring to help projects to establish and become sustainable											
15.2	Increase understanding of tangata whenua around Western ecological principles used alongside mātauranga Māori											
15.3	Provide training for tangata whenua in predator control, kiwi and forest health monitoring, health and safety, etc.											
15.4	Support connection between whānau, hapū and iwi for whanaungatanga and mentoring											
15.5	Increase awareness of tikanga that guides species management											
15.6	Increase opportunities for the cultural use of kiwi											
15.7	Explore cultural harvest as a part of kiwi management											
16.1	Measure the conservation outcomes gained from advocacy opportunities using kiwi											
16.2	Develop advocacy tools and strategies to effectively meet kiwi engagement objectives											
16.3	Upskill kiwi practitioners on effective public engagement											
16.4	Determine impacts associated with public engagement activities on kiwi welfare and stress; incorporate into best practice											
17.1	Continue best practice species management and the national captive management programme											

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Appendix 6 continued

	ACTION (See main document for full description)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
17.2	Review captive management guiding documents to ensure that they are up to date											
17.3	Ensure captive facilities understand their primary role in engagement/advocacy and that nationally consistent messaging is used											
17.4	Finalise 'ZAA/Massey Kiwi Maintenance Diet' and apply in all captive facilities											
18.1	Develop a national research portfolio and communicate it to the research community											
18.2	Support the coordination of task force groups to deal with major research gaps											
18.3	Maintain a database of all published kiwi research											
18.4	Identify DOC datasets that require analysis and write-up											
19.1	Analyse and publish existing data											
19.2	Determine the state of Rakiura tokoeka and implement required management											
19.3	Improve collection of baseline data and responses to management for great spotted kiwi and Fiordland tokoeka											
19.4	Improve our understanding of the ecology and behaviour of all kiwi species											
20.1	Build capability to plan and prepare for long-term organisational health											
20.2	Provide kiwi recovery practitioners opportunities to network, share information, mentor and connect to the national kiwi recovery programme											
20.3	Recognise efforts and celebrate successes											
21.1	Support dissemination of kiwi research and knowledge											
21.2	Provide projects with quality technical advice and support											
21.3	Provide training opportunities for kiwi practitioners											
22.1	Develop strategies to resource the kiwi recovery plan's strategic goal of a 2% increase in kiwi											
22.2	Advocate to funders the need for all project aspects and the importance of multi-year funding											
22.3	Investigate economies of scale that can be coordinated from a national perspective											
22.4	Provide workshops, training opportunities and mentorship to help empower whānau/hapū/iwi and community groups											
22.5	Collaborate with funders to reduce the administrative burden of applications and reporting											

Appendix 7

Alignment of actions with the Department of Conservation’s Intermediate Outcome Objectives and Stretch Goals

Relevant Intermediate Outcome Objectives (IOOs):

- IOO 1.1 - A full range of New Zealand’s ecosystems is conserved to a healthy functioning state
- IOO 1.2 - Nationally threatened species are conserved to ensure persistence
- IOO 1.4 - Nationally iconic species are managed to ensure their populations are maintained or restored
- IOO 1.5 - Locally treasured natural heritage is maintained or restored as partnerships
- IOO 1.6 - Public conservation lands, waters and species are held for now and future generations

Relevant Stretch Goals (SG):

- SG Pests - 50% of New Zealand’s natural ecosystems are benefitting from pest management
- SG Enrichment - 90% of New Zealanders’ lives are enriched through connection to our nature
- SG Iwi - Whānau, hapū and iwi are able to practise their responsibilities as kaitiaki of natural and cultural resources on public conservation lands and waters
- SG Species - 90% of our threatened species across New Zealand’s ecosystems are managed to enhance their population.

ACTION (See main document for full description)	IOO 1.1	IOO 1.2	IOO 1.4	IOO 1.5	IOO 1.6	SG PESTS	SG ENRICHMENT	SG IWI	SG SPECIES
1.1 Implement landscape-scale pest control									
1.2/ 4.4 Measure the response of South Island kiwi to management to determine optimal landscape-scale management (same as 4.4)									
1.3 Use multiple pest control tools to reduce resistance to any one method and ensure all predatory mammals that threaten kiwi are targeted									
1.4 Maintain sites to develop new tools									
1.5 Increase the scale and connectivity of protected habitat									
1.6 Develop and promote best practice predator control									
1.7 Secure pest-free islands and fenced-sites									
1.8 Support predator-free Rakiura									
1.9 Test whether little spotted kiwi can survive on a pest-managed mainland site									
2.1 Develop and sustain collaborations for responsible dog ownership and control									
2.2 Increase interagency response capacity for addressing dogs that kill kiwi									
2.3 Engage people to reduce the dog threat to kiwi									
2.4 Refine avian avoidance methods and equipment for dogs									
2.5 Research options to minimise the impact of dogs									
2.6 Ensure permitting consistency for dogs on public conservation land									

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Appendix 7 continued

	ACTION (See main document for full description)	IOO 1.1	IOO 1.2	IOO 1.4	IOO1.5	IOO4.2	SG PESTS	SG ENRICHMENT	SG IWI	SG SPECIES
2.7	Provide training to collect evidence suitable for prosecution when dogs kill kiwi									
3.1	Incorporate genetic principles into national strategies and management									
3.2	Develop a national genetic management plan for kiwi									
3.3	Publish the taxonomy of kiwi									
3.4	Clarify the role of hybrid and mixed provenance populations									
3.5	Create a database of genetic samples									
3.6	Support efforts to incorporate genetic technologies into kiwi management									
3.7	Ensure little spotted kiwi populations have sufficient founders									
3.8	Retain genetic diversity of unmanaged populations of Haast tokoeka									
4.1	Identify and fill national and regional survey information gaps, especially for South Island kiwi species									
4.2	Implement a long-term monitoring programme to determine whether the 2% gain goal is being met for each kiwi species									
4.3	Improve survey and monitoring tools									
4.5	Develop consistent systems for data comparison over time and space									
4.6	Collaboratively collect data and report on distribution and changes in the state of kiwi									
5.1	Develop and implement systems to curate historic, current and future priority kiwi data									
5.2	Appoint a kiwi data management role									
6.1	Prepare biennial progress report for recovery plan.									
6.2	Review this recovery plan									
6.3	Review Kiwi Recovery Group membership									
6.4	Communicate Recovery Group purpose and work									
6.5	Communicate national issues, new ideas, new technologies and updated best practice									
6.6	Review resources for advice and fill key gaps									
7.1	Revise the template for species and regional (formerly 'taxon') plans									
7.2	Update all species and regional plans by 2021									
7.3	Support topic-based groups									
7.4	Support regional- and species-based groups									
7.5	Ensure connections between the Kiwi Recovery Group and regional-, species- and topic-based groups									
8.1	Implement a DOC operational plan for 2015 Budget funding with regular review to ensure on track									
8.2	Create synergies for DOC work with ecosystem and species management units									
8.3	Regularly plan and review major DOC kiwi expenditures by operational and science staff									
8.4	Support relationships between DOC-led kiwi projects and business groups									
8.5	Increase DOC support to and build relationships with whānau/hapū/iwi									
9.1	Regularly update the Kiwi Best Practice Manual									
9.2	Create a Kiwi Best Practice Committee									
9.3	Train practitioners on best practice standards									
9.4	Refer to and monitor best practice through permit systems									
10.1	Record translocations and their outcomes in the DOC translocation database									

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Appendix 7 continued

	ACTION (See main document for full description)	IOO 1.1	IOO 1.2	IOO 1.4	IOO1.5	IOO4.2	SG PESTS	SG ENRICHMENT	SG IWI	SG SPECIES
10.2	Review kiwi translocations									
10.3	Write the national kiwi translocation strategy									
10.4	Upskill practitioners on translocation technical aspects and tikanga									
11.1	Retain genetic diversity at current kōhanga kiwi									
11.2	Ensure that kōhanga kiwi release sites meet goals and requirements from the National Kiwi Translocation Strategy									
12.1	Include ONE as part of the kiwi translocation strategy									
12.2	Develop long-term plans for managing rowi and Haast tokoeka in the wild									
12.3	Renew the national ONE translocation plan									
12.4	Ensure consistent reporting of ONE nationally									
12.5	Develop crèche management protocols									
13.1	Support protection in production landscapes									
13.2/ 14.1	Promote the inclusion of statutory protection of kiwi and their habitat in district plans (same as Action 14.1)									
13.3/ 14.2	Provide information on kiwi distribution and priority areas for management to local authorities (same as Action 14.2)									
13.4	Increase opportunities for kiwi protection in planning processes									
13.5	Recognise kiwi protection efforts and successes through media and sector channels									
14.3	Raise awareness of kiwi threats associated with land use and pet ownership									
15.1	Provide project governance and management mentoring to help projects to establish and become sustainable									
15.2	Increase understanding of tangata whenua around Western ecological principles used alongside mātauranga Māori									
15.3	Provide training for tangata whenua in predator control, kiwi and forest health monitoring, health and safety, etc.									
15.4	Support connection between whānau, hapū and iwi for whanaungatanga and mentoring									
15.5	Increase awareness of tikanga that guides species management									
15.6	Increase opportunities for the cultural use of kiwi									
15.7	Explore cultural harvest as a part of kiwi management									
16.1	Measure the conservation outcomes gained from advocacy opportunities using kiwi									
16.2	Develop advocacy tools and strategies to effectively meet kiwi engagement objectives									
16.3	Upskill kiwi practitioners on effective public engagement									
16.4	Determine impacts associated with public engagement activities on kiwi welfare and stress; incorporate into best practice									
17.1	Continue best practice species management and the national captive management programme									
17.2	Review captive management guiding captive documents to ensure that they are relevant and up to date									
17.3	Ensure captive facilities understand their primary role in engagement/ advocacy and that nationally consistent messaging is used									
17.4	Finalise 'ZAA/Massey Kiwi Maintenance Diet' and apply in all captive facilities									
18.1	Develop a national research portfolio and communicate to the research community									
18.2	Support the coordination of task force groups to deal with major research gaps									

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Appendix 7 continued

	ACTION (See main document for full description)	IOO 1.1	IOO 1.2	IOO 1.4	IOO 1.5	IOO 4.2	SG PESTS	SG ENRICHMENT	SG IWI	SG SPECIES
18.3	Maintain a database of all published kiwi research									
18.4	Identify DOC datasets that require analysis and write-up									
19.1	Analyse and publish existing data									
19.2	Determine the state of Rakiura tokoeka and implement required management									
19.3	Improve collection of baseline data and responses to management for great spotted kiwi and Fiordland tokoeka									
19.4	Improve our understanding of the ecology and behaviour of all kiwi species									
20.1	Build capability to plan and prepare for long-term organisational health									
20.2	Provide opportunities to network, share information, mentor and connect to the national programme									
20.3	Recognise efforts and celebrate successes									
21.1	Support dissemination of kiwi research and knowledge									
21.2	Provide projects with quality technical advice and support									
21.3	Provide training opportunities for kiwi practitioners									
22.1	Develop strategies to resource the kiwi recovery plan's strategic goal of a 2% increase in kiwi									
22.2	Advocate to funders the need for all project aspects and the importance of multi-year funding									
22.3	Investigate economies of scale that can be coordinated from a national perspective									
22.4	Provide workshops, training opportunities and mentorship to help empower whānau/hapū/iwi and community groups									
22.5	Collaborate with funders to reduce the administrative burden of applications and reporting									