

Small group of distinctive flightless and generally nocturnal birds. More often heard than seen; most vocal in the first two hours of darkness. Males smaller and have loud shrill clear ascending whistle; females deeper hoarse whistle, often given in response to male call; calls repeated 10–25 times. Large cone-shaped bills with small head and long bill with nostrils near tip; minute remnant wings and no tail; coarse loose feathers; strong legs and toes with long claws. Slow lumbering gait, but can run fast. In native forests, scrub, rough tussock grassland and in some exotic forests; from sea level to subalpine. Kiwi snuffle as they explore for food on ground. Feed on invertebrates (especially worms, bugs, beetles and spiders) and fallen fruits, from surface and by probing up to 10 cm into soil. Lay 1–2 huge white eggs in a burrow, hollow log or under dense vegetation. Very long incubation – by the male only in Little Spotted Kiwi and Brown Kiwi in the North Island, but by male and female in Great Spotted Kiwi and Brown Kiwi in the South Island, and by the pair plus helpers in Brown Kiwi on Stewart Island. Chicks hatch fully feathered, like miniature adults, and are mobile within a week but return to the nest each day for several weeks or even years.

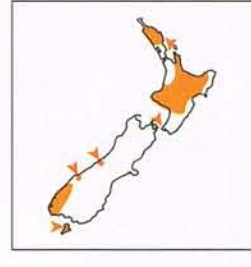
**BROWN KIWI (Rowi – Okarito, Tokoeka – Fiordland and Stewart Island)**

*Apteryx australis*

Uncommon endemic

40 cm; ♂ 2.2 kg, ♀ 2.8 kg. Dark greyish brown *streaked lengthways* reddish brown; long ivory bill. Male has shrill clear (or slightly warbling) ascending and then descending whistle; female has lower-pitched, hoarse cry. **Habitat:** Native forest, scrub, exotic forest (especially in Northland, Coromandel and Taranaki), rough farmland and tussockland (subalpine and dunes). Most common in Northland and on Stewart Island; small distinctive populations at Okarito (60–100 birds) and near Haast (200–300 birds). **Breeding:** Jun–Mar.

[Sp 1]



**KIWI**

3 species: family endemic to New Zealand.

Kiwi are flightless birds standing up to 45 cm high. They are evidently an early offshoot from the evolutionary line of the primitive flightless ratites (moa, emu, cassowary, ostrich and rhea). Kiwi are more closely related to emus than moa. They are one of the oldest members of the New Zealand avifauna as their ancestors are believed to have been in New Zealand when it broke away from Gondwanaland about 65 million years ago.

Kiwi are usually nocturnal, but on Stewart Island some forage by day. They have small eyes but apparently good night vision. Large ears enable good hearing. Kiwi have a very well-developed sense of smell; the nostrils are uniquely placed near the tip of the long, sensitive bill. They can be heard breathing through the nostrils as they explore the ground for food, producing a snuffling sound like that of a hedgehog.

Long, tactile facial bristles surround the base of the bill. The feathers have a simple structure with a single rachis and unlinked barbs, and they hang loose like hair. The wings are minute and largely unfeathered, but they have a soft claw at the tip. They have no tail, and thus look distinctively rounded or pear-shaped. The legs are short and powerful; the three forward-pointing toes and small hind toe have long sharp claws, used for fighting and digging. Other unusual physical features of kiwi are that females have a pair of functional ovaries rather than just one, and that the body temperature and metabolic rate are lower than in most other birds.

Kiwi live from sea level to alpine tussockland and herbfields at about 1500 m asl. They are mostly in native forest but are also found in scrubland, rough farmland, swamps and pine forests, especially where native vegetation remains in the gullies. Diet is mainly invertebrates, particularly insect larvae, worms and spiders, taken from the soil by plunging their bill deep into the earth, often right up to the 'hilt'. Kiwi also eat fallen fruits.

Females are larger and heavier than males. In proportion to the size of the female, the egg

**Apterygidae**

is very large at about 15–20% of body weight. It is also very rich in nutrients and energy. She lays 1–2 white or greenish eggs in a burrow, in a hollow log or under dense vegetation, the eggs laid 2–4 weeks apart. The very long incubation of 65–85 days is by the male only in the Little Spotted Kiwi and the Brown Kiwi in the North Island, by the male and female in the Great Spotted Kiwi and the Brown Kiwi in the South Island, and by the pair and helpers in the Brown Kiwi on Stewart Island. Brood patches develop on incubating birds. Each chick hatches fully feathered and first leaves the nest about a week later. It feeds unaccompanied, and returns less and less often to the nest. The young usually stay in the territory for several months, but they disperse as the next breeding season approaches, except on Stewart Island, where family groups remain together.

Although seldom seen, kiwi indicate their presence by their penetrating calls. Call rates are highest in the two hours after dusk and before dawn. Males and females often duet, with the male call being a drawn-out, ascending, shrill whistle note, repeated 15–25 times, whereas the female call is a hoarse, guttural note, repeated 10–20 times.

The range and number of all kiwi species has been reduced since humans arrived in New Zealand, but especially over the last hundred years. Forest clearance has reduced available habitat, and populations have become fragmented and isolated, but the main impact now is from introduced predators: possums damage eggs, and mustelids and feral cats kill young chicks, and adults are especially at risk from dogs, ferrets and poorly set possum traps. Kiwi are sometimes killed on roads at night. Injured kiwi have been kept in captivity, and much has been learned of their habits. Brown Kiwi and, recently, Little Spotted Kiwi have been bred in captivity, and Brown Kiwi are on display at captive breeding facilities in New Zealand and overseas.

**Reading:** www.kiwirecovery.org.nz. *DoC Threatened Species Rec Plan Ser No. 2*. Fuller, E. (ed) 1990. *Kiwis*. Auckland: SeTo Publishing. Peat, N. 1999. *Kiwi: NZ's Remarkable Bird*. Auckland: Godwit. Reid, B. & Williams, G.R. 1975. In *Biogeography and Ecology in New Zealand*. The Hague: Junk.

**1. BROWN KIWI *Apteryx australis***

**Plate 1**

**Other names:** Rowi (Okarito), Tokoeka (Fiordland and Stewart Island)

**Size:** 40 cm; male 2.2 kg, female 2.8 kg

**Geographical variation:** Results of recent genetic studies show that the Brown Kiwi should be split into three quite distinct, but similar looking species: 'Brown Kiwi' *Apteryx mantelli* in the North Island, 'Rowi' *Apteryx rowi* near Okarito, and 'Tokoeka' *Apteryx australis* with distinct varieties near Haast, in northern Fiordland, in southern Fiordland and on Stewart Island.

**Distribution:** Subfossil and Maori midden remains indicate that Brown Kiwi were widespread throughout mainland New Zealand in pre-European times. Since 1900, their range has contracted markedly and many populations have become fragmented and isolated, while others have become locally extinct. Still locally common north of Whangarei and well established on Little Barrier, Kawau and Ponui Islands in the Hauraki Gulf. Sparsely distributed, but sometimes locally common, in the Coromandel Peninsula, the Bay of Plenty, from Gisborne to the northern Ruahine Range, and from Tongariro through the Whanganui/Taranaki hinterland and on Mt Taranaki. A small population (c. 50 birds) on the higher parts of Kapiti Island seems to be partly from Fiordland stock introduced in the early 1900s. The South Island has three separate and sparse populations: in lowland forests between Okarito and the Waiho River (West Coast), in the mountains just south of Haast, and in Fiordland from the Hollyford Valley to Preservation Inlet. Brown Kiwi remain common on Stewart Island.

**Population:** North Island, widespread and locally common; Okarito 200 in 2004; Haast 200–300; Fiordland, widespread; Stewart Island widespread and common; captivity c. 120 in 2005.

**Conservation:** Protected threatened endemic. The fragmentation and decline of populations has been alarming and continues even though forest clearance has almost ceased. Since the 1970s, the disappearance of Brown Kiwi from apparently suitable habitat has been noted in Northland, King Country, Kaimanawa

Range, Hawke's Bay and parts of eastern Fiordland. Many populations are not self-sustaining because adult mortality (from ferrets, dogs, pigs, possum traps and natural causes) exceeds breeding productivity, which is low because possums, mustelids and cats eat eggs or young chicks.

In the 1990s, much effort has been directed at identifying the main threats to kiwi and trying to manage key mainland populations in the wild by controlling predators. The small number of Brown Kiwi in captivity at nocturnal houses in New Zealand and overseas has provided opportunities for research and education, and is managed in a way to maintain genetically pure lines from different parts of the country. Although breeding success is variable, the captive population is close to self-sustaining.

**Breeding:** Most eggs are laid in June–December, in a burrow, hollow log or sometimes under dense vegetation. North Island birds lay 1–2–3 clutches of 1–2 white eggs (124 x 80 mm; 440 g). The eggs are laid 3–4 weeks apart, and the male incubates for 75–90 days. Other species lay 1–2 clutches of 1 pale green egg (133 x 84 mm; 530 g), which male and female incubate for 65–75 days. On Stewart Island, juveniles remain with their parents and share with incubation. Incubating birds develop a brood patch.

The chick hatches fully feathered and remains in the nest about a week before venturing out unaccompanied. The chick returns to the nest by day for several weeks. Brown Kiwi chicks in the North Island become independent at 2–5 weeks and disperse from the natal territory, but elsewhere juveniles remain in their parental territory for up to 5 years. Growth continues up to 5 years. First breeding is at 1–8 years old. Most pairs are monogamous and persist through the year and between years. The oldest bird recorded in the wild is over 30 years old, but some probably live at least 60 years.

**Behaviour:** Most vocal in winter and spring. The male call (higher-pitched and clearer) is often answered immediately by its mate; sometimes they call simultaneously. The male

and female of a pair usually feed separately at night, but spend about 20% of days together. During courtship, a pair often remains together for hours, with the birds making loud grunts and snuffling sounds. **Feeding:** Diet is mostly invertebrates but includes some fallen fruits and occasional leaves. Main prey are earthworms, larvae of beetles, cicadas and moths, spiders, orthopterans (weta and crickets) and centipedes, with the proportions varying from place to place and with season. Most are taken from the soil, rotting logs or the surface. When feeding, the bird walks slowly along, tapping the ground and sniffing loudly; it often plunges its bill deep into the earth, right up to the 'hilt'. Sometimes the bird digs a small crater up to 15 cm deep and 10 cm wide when it is struggling to extract a large earthworm.

**In the hand:** Sexes of adults are distinguished by bill length: males 81–100–120 mm, females 111–130–157 mm with much regional variation, but little overlap within populations. Females are heavier (2090–2750–4010 g for non-gravid birds) than males (1720–2250–3060 g). The bill of some birds continues to grow for at least the first 5 years.

**Reading:** Baker, A.J. et al. 1995. *Proc. Natl. Acad. Sci. USA* 92: 8254–8258. Burbidge, M.L. et al. 2003. *Cons. Genetics* 4: 167–177. Colbourne, R. & Kleinpaste, R. 1984. *Notornis* 31: 191–201. McLennan, J.A. 1988. *NZ J Ecol* 11: 89–97. McLennan, J.A. & Potter, M.A. 1992. *NZ J Ecol* 16: 91–97. McLennan, J.A. et al. 1987. *NZ J Ecol* 10: 97–107. McLennan, J.A. et al. 1996. *NZ J Ecol* 20: 27–35. Potter, M.A. 1990. *NZ J Ecol* 14: 17–24. Taborsky, B. & Taborsky, M. 1992. *Ibis* 134: 1–10. Tennyson, A.J.D. et al. 2003. *Rec. Auck Mus.* 40: 55–64.