

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 birds 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.

GREAT SPOTTED KIWI (Roroa, Roa) *Apteryx haastii*

Uncommon endemic

45 cm; ♂ 2.4 kg, ♀ 3.3 kg. Largest kiwi. Light brownish grey tinged with chestnut, mottled or banded *horizontally* with white; massive ivory bill; legs dark brown; claws vary from horn to black. Juvenile has proportionately longer bill and darker legs than similar Little Spotted Kiwi. Male very loud shrill warbling whistle; female slower and lower-pitched ascending warble; calls more powerful and slower than Little Spotted Kiwi. **Habitat:** Native forest, scrub, pakihi wetlands and tussock grassland from sea level to subalpine, but distribution patchy. Strongholds in north-western Nelson, Paparoa Ranges and between Lake Sumner and Arthur's Pass. **Breeding:** Jul–Dec.



[Sp 3]



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.

3. GREAT SPOTTED KIWI *Apteryx haastii*

Plate 1

Other names: Roroa, Roa
Size: 45 cm; male 2.4 kg, female 3.3 kg
Distribution: Subfossil and Maori midden remains indicate that Great Spotted Kiwi have always been restricted to the South Island. In the 1800s, they were recorded throughout Westland, western Canterbury and north-western Nelson, but in the 1900s their range in Westland has contracted from the south to about the Taipo River, near Hokitika. Great Spotted Kiwi remain locally common in three recently isolated populations: from north-western Nelson (e.g. Heaphy Track) to north of the Buller River near Westport, in the Paparoa Ranges, and in the Southern Alps from the Hurunui River to Arthur's Pass. Ten

birds released at Lake Rotoiti in 2004–05.
Population: 20,000 birds. Northwestern Nelson to Buller River, widespread and locally common; Paparoa Range, widespread and common in some areas; Hurunui River to Arthur's Pass, widespread and locally common in higher forests.

Conservation: Protected threatened endemic. The fragmentation and decline of populations this century has been slower than for the Brown Kiwi, and apparently stable populations remain in remote wet country in northwestern Nelson and northern Westland. However, since 1900, the disappearance of local populations from apparently suitable habitat has been noted in parts of the Grey

Valley and northern Westland. Some populations are likely to be not self-sustaining because adult mortality (from dogs, pigs, possum traps and natural causes) exceeds breeding productivity, which is low because possums, mustelids and possibly cats eat eggs or young chicks.

One concern for Great Spotted Kiwi is that none are established on a predator-free island (19 birds transferred from Nelson to Little Barrier Island in 1915 failed to establish). Since the 1980s, effort has been directed at studying the ecology of Great Spotted Kiwi, identifying their distribution and monitoring the three main populations.

Breeding: Most eggs are laid in July–December. They lay 1 white egg (124 x 77 mm; 435 g) in a hole among roots of a tree, in a hollow log, in a burrow or sometimes under a fallen log or in dense vegetation. The male incubates during the day and for about half the night, but the female incubates for half the night while the male feeds. The incubation period is c. 70 days. Little is known of chick development, but like other kiwi the Great Spotted hatches fully feathered and remains in the nest for a week before venturing out; it reaches adult size at c. 4 years. Pairs are monogamous and persist all year and between years.

Behaviour: Call rate is fairly even throughout the night, with a peak just before dawn, and they are most vocal in summer. The male call (higher-pitched and clearer) is often answered immediately by its mate. The male and female of a pair usually feed separately at night, but spend about 40% of days together. Great

Spotted Kiwi are much warier of humans than are other kiwi, and often slip away from their daytime shelters well before they are seen.

Feeding: Diet is mostly invertebrates and fallen fruits, along with occasional leaves. Main prey are earthworms, beetles, spiders, centipedes and fruit, but weta, freshwater crayfish and *Powelliphanta* snails have also been recorded. Most food is taken from the soil, leaf litter or rotting logs. When feeding, the bird walks slowly along, tapping the ground and sniffing loudly; it sometimes plunges its bill deep into the earth, right up to the 'hilt'. Sometimes the bird digs a distinctive small crater up to 15 cm deep and 10 cm wide when it is struggling to extract a large earthworm.

In the hand: Sexes are distinguished by size, with little overlap in adult bill measurements: males 83–97–104 mm, females 103–120–135 mm. Females are significantly heavier (2850–3300–4300 g) than males (1750–2400–3000 g). Great Spotted Kiwi are considered to be juvenile if the proportion of body weight (kg) and bill length (cm) is less than 16.0 for males and 27.6 for females, but young females pass through a stage when they cannot be distinguished from adult males. Juvenile Great Spotted Kiwi can look like adult Little Spotted Kiwi, but have a browner back and legs, and have brown (not ivory or pale pink) claws.

Reading: McLennan, J.A. 1990. In *Kiwis*. Auckland: SeTo Publishing. McLennan J.A. & McCann, A.J. 1991. *DSIR Land Resources Contract Report 91/48*, Department of Conservation. McLennan J.A. & McCann, A.J. 1991. *NZ J Ecol* 15: 163–166. McLennan, J.A. & Potter, M.A. 1993. *Notornis* 40: 294–297. McLennan J.A. *et al.* 1996. *NZ J Ecol*. 20: 27–35.