

THE IDENTITY OF THE HAKAWAI

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ABSTRACT

The hakawai was a 'mystery bird' formerly found on islands off Stewart Island; although never seen, its startling call was heard at night. The call of the hakawai, and its distribution and decline are described. The hakawai (under several spelling variations) is widely mentioned in myths and legends of the Maori throughout New Zealand; these records are summarised and the various theories for the hakawai's identity are discussed.

Evidence for non-vocal aerial displaying by New Zealand snipe (*Coenocorypha*) is presented. The hypothesis that the hakawai was an aerial display of Stewart Island Snipe (*C. aucklandica iredalei*) was investigated by comparing the distribution and decline of snipe with that of the hakawai, and by playing a tape recording of an aerial display of Chatham Island Snipe (*C. pusilla*) to people who had heard the hakawai. These data support the hakawai = snipe hypothesis. The historical distribution of Stewart Island Snipe included Big South Cape, Pukeweka, Solomon, Poutama, Jacky Lee, Herekopare, Ruapuke and Green Islands in the last 100 years. The extinction of snipe on these islands is attributed to introductions of ship rats (*Rattus rattus*, two islands), weka (*Gallinallus australis*, four islands) and a combination of weka and cats (*Felis catus*, two islands).

It is proposed that subfossil remains of *Coenocorypha* from the North Island and the South Island be referred to *C. a. barrierensis* Oliver 1955 and *C. a. iredalei* Rothschild 1921 respectively.

INTRODUCTION

The early ornithological and anthropological literature of New Zealand contains many tantalising references to the birds encountered by the Maori before the arrival of Europeans. Many of the traditional oral accounts given describe species that are familiar to 20th century observers, but others can only refer to some of the 35 or so bird species known to have become extinct during about 1000 years of Polynesian colonisation up to AD 1800. While legends or descriptions of huge moa and the giant eagle *Harpagornis* have long captured the public's imagination, the recent interest in subfossil deposits of our smaller prehistoric inhabitants invites re-examination of accounts of less spectacular animals. Was kopa the extinct owl-nightjar (*Megaegotheles*)? What of the poua on the Chatham Islands, or the mysterious ruwuhenua? (See Beattie 1954: 40.)

Trying to match fragments of an oral tradition with bone fragments of extinct birds is an intriguing pastime, but it is difficult to progress beyond speculation. However, not all mythical birds belong to such distant times. The hakawai was last reported in 1961 (Bell, B. D. & Merton, D. V. A classified list, with notes on the species, of birds of Big South Cape Island, April 1961. Unpubl. report NZ Wildlife Service). It is still fresh in the memory of many people who hold muttonbirding rights to the islands off Stewart Island. The story of the hakawai has an added piquancy; although many people can recall the loud, startling cry of the hakawai, the animal responsible has not been seen.

Many early ornithologists in New Zealand speculated on the identity of the hakawai, and muttonbirders are still interested. My interest in the hakawai arose through my research on New Zealand snipe (*Coenocorypha*); the Stewart Island Snipe (*C. aucklandica iredalei*) was one of the many birds that had been suggested as the hakawai (Anon. 1931; Bell & Merton, unpubl.). After hearing aerial displays by Chatham Island Snipe (*C. pusilla*) on South East Island in December 1983, I collected data to test the hypothesis that the hakawai was the Stewart Island Snipe giving its aerial display. Much of the information in this paper was gleaned from conversations with muttonbirders in Southland and on Stewart Island in 1985, and from replies to questionnaires sent to muttonbirders from Kundy and Big Moggy Islands.

THE CALL OF THE HAKAWAI

Even on the few islands where it was known, the hakawai was rarely heard. The call was heard on calm moonlit nights and came from a great height. A human-like rendition of its name, *hakwai*, *hakwai*, *hakwai*, was followed by a considerable roar, as of a bird travelling at great speed "and this increases in volume as the descent is made until the air vibrates with it" (Anon. 1931).

My informants all agreed on the qualities of the first part of the call, but I received differing descriptions of the second (non-vocal) component. The most popular description of the call of the hakawai was that it resembled "a sound as if a cable chain was lowered into a boat" (Native 1931). Indeed, many people still refer to the hakawai as the chainbird. Some people familiar with the hakawai did not like this description and likened the sound to a "jet-stream" or "a blind rolling itself up" (Billy McQuarrie, pers. comm.) or "a shell passing overhead" (Rongo Spencer, pers. comm.).

Not all these differences are just personal differences in the interpretation of the same noise. Alan Skerrett (pers. comm.) thought that the hakawai call resembled a jet-stream sound but heard the 'rattling chain' occasionally as well: "Sometimes its rapid descent is accompanied by a rustling noise and sometimes by a chain sound" (Beattie 1954: 37). Bell & Merton (unpubl. report) "... never heard the so-called 'chain rattle' but once heard something approaching this".

However the hakawai's call was described, its effect on observers was fairly consistent. Many written accounts refer to physical reactions to the sound: "The next thing he knew he and his load of birds were mixed up together on the ground. He had fallen over in his fright". "I realized that I had heard the mystery bird and was off down the hill as fast as my legs could carry me, forgetting all about my stay at Te Maru" (Wilson 1979: 92). Several of the people that I spoke to remarked that they were very frightened of the "whizzing" noise.

Memories of the hakawai are kept alive not only by the mystery of its identity but also by the eerie quality of its sound and the web of myth and legend that has been spun around it.

MYTHS AND LEGENDS OF THE HAKAWAI

Although I have chosen to use the name *hakawai*, used by the southern muttonbirders, many variations in spelling and pronunciation are in the literature (Table 1). The usual variant is the northern Maori *hokioi*; the equivalence of the different names has been pointed out by Tregear (1897: 79), Best (1942: 152), Beattie (1954: 37), Reed (1963: 387) and Williams (1971: 33, 57 & 239). I will use *hokioi* or *hakawai* while discussing myths and legends to match the sources quoted; other variants will be given only in direct quotations.

TABLE 1 — Alternative spellings of 'hakawai'

<i>hākuwai</i>	White 1887; Best 1942 & 1982; Jenkin 1970; Williams 1971
<i>hakuai</i>	Tregear 1897; Pio 1901; Beattie 1954; Williams 1971
<i>hakowai</i>	Beattie 1954
<i>hark-oh-why</i>	Henderson 1981
<i>hokiwai</i>	Urumotu & Kerehoma 1872; Williams 1971
<i>hokioi</i>	Haast 1873; Tregear 1897; Best 1924 a & b, 1942; Reed 1961 & 1963
<i>hokio</i>	White 1885; Tregear 1897; Williams 1971
<i>ōkio</i>	Ngata 1970
<i>okioi</i>	Tregear 1897; Williams 1971

The *hakawai* was one of the 11 *tapu* (sacred) birds of *Rakamaomao* (the wind) and was said to have been a descendant of *Tangaroa* (god of the ocean) and *Rehua* (the star Antares, guardian of the uppermost heaven) (Best 1982: 265 & 563). In Maori legends and proverbs, the *hakawai* was a mythical bird dwelling afar in celestial space and only descending to earth at night. It was "the bird elusive and never seen, By the multitude in their thousands" (Ngata 1961: 261).

Several proverbs refer to the nocturnal habits of the *hakawai*, or its ability to conceal itself: "*Pekapeka rere ahiahi, hokioi rere po* (The bat flies at twilight, the *hokioi* at night)" (Reed 1963: 387); ". . . *ko taua manu he pena hoki me te Hokiwai, he manu whakangaro i tona tinana*" (that bird is like the *Hakawai*, it makes itself invisible) (Urumotu & Kerehoma 1872).

The *hakawai* lived in the heavens (White 1887: 130) and was considered the ancestor of ceremonial kites built by the Maori. A charm-song for an *aute* bird (kite built of paper mulberry) given by Pio (1901) finishes:

Pikitia e koe ki to matua, ki a Hakuai
Ki to tupuna, kia Rehua i te rangi-e.
 "Climb thou to thy ancestor, the *Hakawai*,
 To thy ancestor, *Rehua* in the heavens."

The most widely quoted legend about *hokioi* refers to a competition between *hokioi* and *kahu* (the hawk) to see who could fly the highest. This story explains why *hokioi* descends only at night and why he calls out his name. Different versions are given by Grey (1872), Best (1924a: 215-216,

1942b: 57 & 1982: 563-564) and Reed (1961: 193-194 & 1963: 387), but the legend is as follows:

An argument arose between Kahu and Hokioi as to who could fly the highest. Kahu taunted Hokioi, saying that he could fly no better than Matata (the fernbird). This so angered Hokioi that he challenged Kahu to a trial, as to which could ascend the highest. Then both left the ground and flew to a great height. As he flew upward, Kahu kept continuous watch on the earth, as is his habit. Soon he saw some fern on fire and, forgetting the challenge, descended to prey on the creatures fleeing from the flames. Hokioi cried out to Kahu *He pakiwaha koe* ["You are a boaster"] then continued his flight until he lost sight of the earth. Hokioi never returned to earth again, but sometimes at night he is heard calling out his own name in derision of Kahu: *Hokioi! Hokioi! Hu!*

The last word *hu* represents the rushing sound of his flight, as heard by the Maori folk of this world.

There is nothing to be seen, but you hear a cry, a dreadful laughter floating down from the heights. "Hokioi-Hokioi" is the cry, and as it ceases you hear that eerie whistle as a bird swoops down and up again into the blackness and silence of the night sky (Reed 1961: 193).

The legend gave rise to a proverb which is applied to boasters: *E hoa! He hakuwai te manu e karanga tonu ana i tona ingoa*. (Oh friend! The hakawai is the bird that is ever calling out its own name.)

To hear the cry of the hakawai was a bad omen. White (1885: 166) stated that the hakawai was heard on the eve of war, and that the cry was "caused by the choking of the bird with the hair of the heads of those warriors who are doomed to fall in the battle". In more recent times, the call of the hakawai was thought to forecast a southerly gale (Native 1931, Beattie 1954: 37, Jenkin 1970: 157); although it could be argued that bad weather will always follow a clear moonlit night in the stormy latitudes of the muttonbird islands.

Many muttonbirders believed that the hakawai could be heard only towards the end of the muttonbird season (May). From this arose the idea that the hakawai was the father of the muttonbirds (*Puffinus griseus*), calling them away on their northern migration (Edwards 1954, Blackburn 1965). Some say that when the hakawai called all the muttonbirds came to the mouth of their burrows and listened (Beattie 1954: 38). The idea that the hakawai called only at the end of the muttonbird season is probably a result of observers being out at night mostly at the end of the season, when young muttonbirds come out of their burrows and can readily be caught. Earlier in the season, young muttonbirds are taken by day, from their burrows ('nanaoing'). Also, towards the end of the season most of the adult muttonbirds have departed on their northern migration, and so the nights are quieter and other sounds may be heard more easily. The muttonbirders are not on the islands from the end of May to mid-March.

Bell & Merton (unpubl.) heard hakawai in April, and Billy McQuarrie (pers. comm.) heard it in June. Several people that I spoke to thought the hakawai could be heard at any time of the year.

Kaiporohu told James Drummond that the hakawai lived in the clouds over Foveaux Strait, hovering invisibly (Beattie 1954: 36). Its call was first heard in the north, then in the south, east and west. The hakawai was thought

always to fly in the same direction when giving its call, given as east to west for Herekopare Island by Dempsey (1967:96).

THE DISTRIBUTION OF THE HAKAWAI

The range of the hakawai had decreased steadily up to its disappearance in the early 1960s. Often information on the past distribution of the hakawai is vague, and it is difficult to assign dates to many records. The following summary starts with the most recent records and works back to pre-European days; this sequence roughly follows a south to north geographical sequence. Where possible, the decline of the hakawai on each island has been compared with the date of introduction of one or more of the following terrestrial predators: ship rat (*Rattus rattus*), cat (*Felis catus*) and weka (*Gallirallus australis*).

A. The islands off the south-west coast of Stewart Island

BIG SOUTH CAPE ISLAND

Big South Cape Island (Fig. 1D), the largest muttonbird island (930 ha), was long considered the stronghold of the hakawai. This was the only island where hakawai survived alongside the weka, which the muttonbirders introduced to many of the muttonbird islands for food and, on some, to control rodents.

Hakawai were usually heard over the low pakihi vegetation in the centre of the island, particularly between the two high points Mt Onion and Paopoko. I have one record of a hakawai being heard over the forested coastal slopes (Rongo Spencer, pers. comm.). On Big South Cape I. weka were mainly found under the forest (Guthrie-Smith 1936: 183, Richdale [no date a], Bell & Merton unpubl.) but have occupied the pakihi since the rat invasion (Bell, B. D. & O'Brien, J. F. O., 1964. Big South Cape Island, 16-28 April. Unpubl. report NZ Wildlife Service).

Hakawai were heard regularly on Big South Cape I. until the plague of ship rats which followed the 1963 muttonbird season. The last written report is that of Bell & Merton. No one has heard the hakawai since the rat invasion, although Noki Barrett (pers. comm.) claimed to have heard the first part of the call near the south end of the island in 1983.

POUTAMA ISLAND

Poutama Island, which lies 300 m south of Big South Cape I., held a hakawai population until at least 1931 (Anon. 1931). Native (1931) heard hakawai on Poutama on 10 May 1913, and Peter Beaton heard them during the 1920s (Jack McKay, pers. comm.). Jack McKay first went to Poutama in 1932 but did not hear hakawai there (although he heard them on Big South Cape I. in 1933). Weka had been introduced earlier to Poutama and were common in 1932. Ship rats reached Poutama in 1985.

SOLOMON ISLAND

Solomon Island (26 ha) lies about 200 m north of Big South Cape I. Hakawai were heard on Solomon I. in 1931 (Anon. 1931) and earlier (Eileen Willa, pers. comm.). I do not know whether hakawai were heard on Solomon I. after 1931. Weka have been there since at least 1913, when Guthrie-Smith

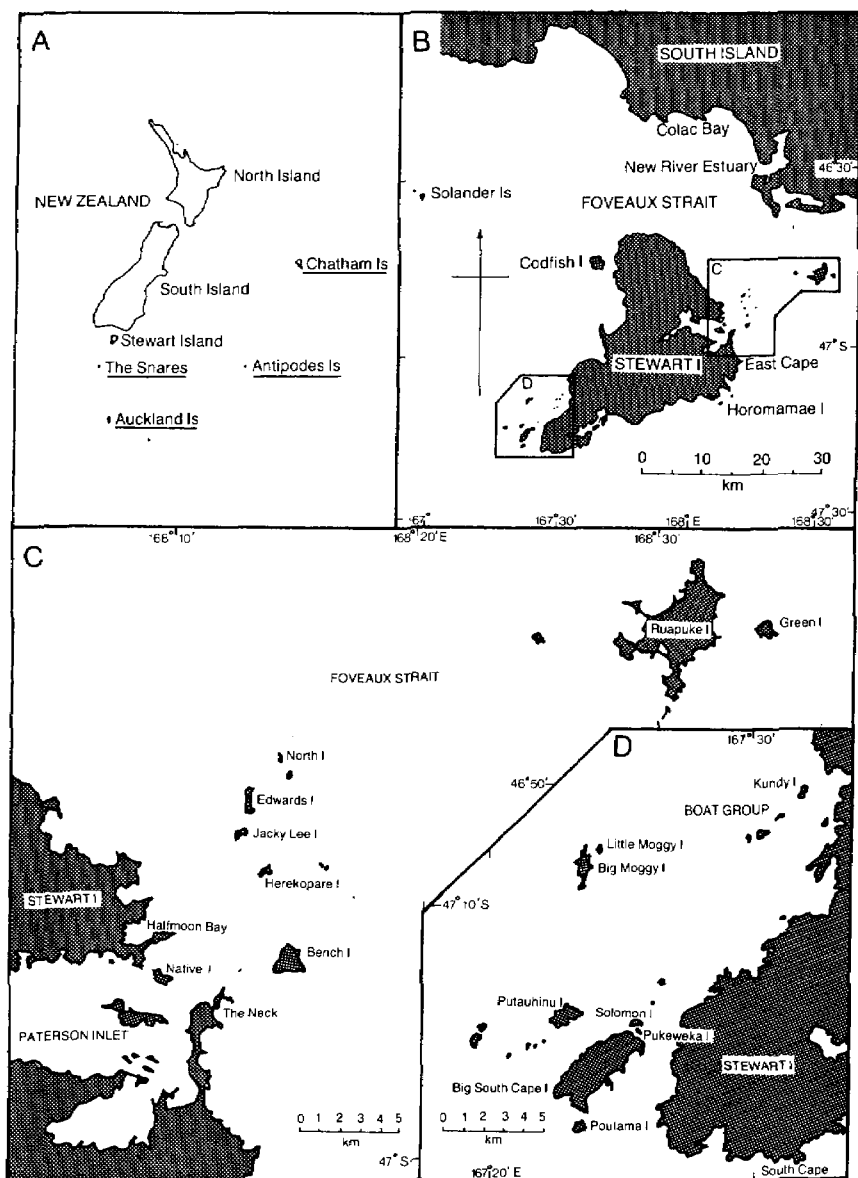


FIGURE 1 — Localities mentioned in the text. Those island groups underlined in 'A' still have snipe. There are reliable reports of hakawai from Ruapuke, Green, Jacky Lee, Herekopare, Solomon, Big South Cape and Poutama Islands in the last 100 years

(1925: 118) saw one or two pairs, but they are kept at a low density by the muttonbirders. Solomon I. was one of the three islands affected by the plague of rats in 1964.

BIG MOGGY ISLAND (MOKINUI)

Big Moggy Island is about 8 km north of Big South Cape I. Edwards (1954) stated that the hakawai "has not put in an appearance at Mokinui Island for some years". O. B. Nilsen (pers. comm.) informed me that his mother had heard a hakawai on Big Moggy Island "one very bright moonlight night, 40 odd years ago". Neither J. A. Hart (pers. comm.), who first visited the island in 1918, nor Patu King (pers. comm.), whose family started birding on Big Moggy I. in about 1890, had heard of hakawai being there.

Kiore (*Rattus exulans*) were already on Big Moggy I. in 1890, cats have been there since about 1915 and weka since before 1918 (J. A. Hart & Patu King, pers. comm.).

KUNDY ISLAND

Kundy Island (22 ha), one of four islands comprising the Boat Group, is about 15 km north-east of Big South Cape I. Russell Smith (pers. comm.) told me that hakawai had been heard there very occasionally in the past. Russel Trow (pers. comm.), who has been birding on Kundy I. since 1949 and whose grandparents birded there from 1905, was unaware of hakawai having been there.

Weka were introduced to Kundy I. in about 1947 (R. Trow, pers. comm.) and were removed by the NZ Wildlife Service in 1984. The island has no rodents.

B. Solander Islands

The Solander Islands lie about 60 km west-northwest of Stewart Island (Fig. 1B). Blackburn (1965) quoted a muttonbinder as saying that he had heard the hakawai on Big South Cape and Little Solander Islands in "recent years". None of the muttonbirders that I spoke to had heard of hakawai on the Solander Is, or of anyone staying overnight on Little Solander I.

I spent two nights on Little Solander I. (8 ha) in July 1985, but heard no hakawai. Solander I. (100 ha) has had weka on it for over 150 years (Cooper *et al.* 1986) but neither island has rodents.

C. The islands off the north-east coast of Stewart Island and in Foveaux Strait

HEREKOPARE ISLAND

Herekopare Island (28 ha) lies 8 km north-east of Halfmoon Bay (Fig. 1C). It is the only island away from the Big South Cape group that is generally recognised as a 'hakawai' island.

Three of the people that I spoke to had heard hakawai on Herekopare: Russell Smith and P. R. & E. Willa. Russell Smith, who first went to Herekopare as a young boy in the early 1920s, heard hakawai there only during the 1920s. The late P. R. (Buddy) Willa had heard the hakawai on Herekopare in the first decade of this century; Mrs Eileen Willa heard it during her only stay on the island, in 1924. Dempsey (1967: 95-97) also mentioned hakawai on Herekopare.

Guthrie-Smith is said to have heard the hakawai on Herekopare (R. Smith, pers. comm.; Dempsey 1967: 97). Although he stayed overnight on Herekopare in October and November 1911, he did not mention hakawai in his 1914 book.

Guthrie-Smith (1914: 15) heard one weka on Herekopare in January 1911, but the weka died out or were removed during the next muttonbird season (P. R. Willa, pers. comm.). Weka were reintroduced in the early 1920s (R. Smith & P. R. Willa, pers. comm.) but were not reported by Wilson (1959) when he and Edgar Stead visited Herekopare in 1932. Weka were apparently present in 1944 (see Fitzgerald & Veitch 1985) and were common in 1952 (Dempsey 1967: 87), but they were removed by muttonbirders before 1968 (Fitzgerald & Veitch 1985).

Cats were introduced to Herekopare in 1924 (P. R. & E. Willa, pers. comm.) and were exterminated by the NZ Wildlife Service in 1970 (Fitzgerald & Veitch 1985).

JACKY LEE ISLAND

Hakawai were 'formerly' heard on Jacky Lee Island (Bell & Merton unpubl.), which is 1.5 km north-west of Herekopare I. Weka, introduced to Jacky Lee I. some time after 1901, were common in 1932 (Wilson 1959: 60).

RUAPUKE ISLAND

Ruapuke is a large island in the eastern approaches to Foveaux Strait, 30 km north-east of Stewart Island. Hakawai were reported from Ruapuke last century (Billy McQuarrie, pers. comm.). The island, being farmed, presumably has cats. Weka are on Ruapuke (Watters 1963), and house mice (*Mus musculus*) colonised when the *Elizabeth Henrietta* ran aground on 25 February 1824 (McNab 1907: 236). Kiores have been reported (Atkinson 1978) but whether other rat species are present is not known. The presence of a colony of White-faced Storm Petrels (*Pelagodroma marina*) in 1941 (Wilson 1959: 105) argues against *Rattus* being there then, if current theories on petrels being vulnerable to rodent predation (Imber 1975, Atkinson 1985) are correct.

GREEN ISLAND

Green Island lies about 2 km east of Ruapuke I. Alfie Ryan told me that his grandfather had heard hakawai on Green I., probably late last century. It is one of the locations given by Beattie (1954: 37). Weka were present, but scarce, in 1941 (Wilson 1959: 110) and are still there (Thomas 1982).

D. The main islands of New Zealand

STEWART ISLAND

Native (1931) mentioned hakawai being heard at South and East Capes, and Dempsey (1967: 96) mentioned the East Cape of Stewart I.; they gave no dates. Weka are indigenous on Stewart I.; there are feral cats and all three species of rat (*R. exulans*, *R. rattus* & *R. norvegicus* - Taylor 1978).

SOUTH ISLAND

Billy McQuarrie and Mrs Eileen Willa both told me of very old reports of hakawai being heard at New River Estuary (Fig. 1B). Old Timer (1931)

recalled hearing a hakawai at Colac Bay, Southland, in 1895; the local Maori at the time agreed that "one had never been seen on the mainland".

Henderson (1981: 221) gave an undated reference to a hakawai being heard (and seen) at Tasman Bay, Nelson.

NORTH ISLAND

A Maori song given by Ngata (1970: 102-107) refers to the hakawai flying from Hikitia, Bay of Plenty.

THEORIES FOR THE IDENTITY OF THE HAKAWAI

Although many people tried to catch a glimpse of a hakawai in their torch beam, no-one succeeded. This was easily explained by those who held that the hakawai was a spirit bird (Edwards 1954, Dempsey 1967: 97); it could not be seen anyway. The rest of the muttonbirders disagree as to the size of the hakawai; some insist that it must have been a large bird to make such a loud noise (Billy McQuarrie, pers. comm., Native 1931, Old Timer 1931), whereas others are equally sure that it must have been a small bird to avoid being caught in the torch beam (Claude Skerrett & Rongo Spencer, pers. comm.).

There are several accounts of large birds with multiple wing joints being found around the Stewart Island region, and some people have suggested that these could be the hakawai. Native (1931) mentioned a part skeleton of a bird unearthed at New River Head; one wing was intact and reckoned to be seven feet in length, with nine joints. Beattie (1954: 38) referred to a strange bird washed ashore on Horomamae Island (Fig. 1B) that was mottled and the size of a gannet. The wing spread was disproportionately large, and there were seven joints in the wing. It had a straight, unhooked bill and the wing feathers were 12 to 14 inches in length with rounded tips. On page 36, Beattie claimed that the hakawai was "supposed to be a big, white, land bird with seven joints in its immense wings". Then he mentioned the hokioi of the Tuhoe people "which lived in the sky, flew only by night at a great height, and had four joints in each wing".

The most elaborate description of a hokioi was given to Sir George Grey (1872) by a Maori:

This bird, the Hokioi, was seen by our ancestors. We (of the present day) have not seen it – that bird has disappeared now-a-days. The statement of our ancestor was that it was a powerful bird, a very powerful bird. It was a very large hawk. Its resting place was on the top of the mountains; it did not rest on the plains. On the days in which it was on the wing our ancestors saw it; it was not seen every day as its abiding place was in the mountains. Its colour was red and black and white. It was a bird of (black) feathers, tinged with yellow and green; it had a bunch of red feathers on the top of its head. It was a large bird, as large as the Moa.

This is a plausible description of the plumage and behaviour of a large eagle, perhaps *Harpagornis*, an eagle known only from subfossil bones and estimated to have weighed up to 13 kg (R. N. Holdaway, pers. comm.). As far as is known, *Harpagornis* had the normal complement of wing joints.

It is inconceivable that a huge, potentially hominivorous diurnal raptor could remain undetected on a 20 ha island. I suggest that over many

generations the eerie call of the unseen hakawai has been linked with racial memories of the most powerful flying bird known to the Maori.

Naturalists from a more prosaic culture have advanced a number of theories to explain the hakawai phenomenon; all but one of the species suggested are seabirds that would come to land only to breed or if storm-driven. Sir Walter Buller and James Cowan favoured the frigatebird (*Fregata* sp.; see Haast 1873 and Beattie 1954: 36). Like the Sooty Tern (*Sterna fuscata*) suggested by Dempsey (1967: 96), the frigatebird can be discounted because it is an infrequent straggler to New Zealand; neither has been recorded in the Stewart Island region.

Neither the Black Petrel (*Procellaria parkinsoni*) suggested by James Drummond (Beattie 1954: 36) and Edgar Stead (Wilson 1959: 148) nor the Shoemaker (*P. aequinoctialis*) suggested in Jenkin (1970: 157) breeds near Stewart Island. Although both species may occur in the seas around Stewart Island, their known calls do not include anything like the hakawai, and they are unlikely to occur over any island on which they do not breed.

Lance Richdale was said to have favoured the Mottled Petrel (*Pterodroma inexpectata*) as the hakawai's alias (Beattie 1954: 36), and Beattie also mentioned the Diving Petrel (*Pelecanoides urinatrix*). Both these species still breed on many islands around Stewart Island and elsewhere, and their past distributions have always been more extensive than that of the hakawai.

Perrine Moncrieff (1931), in a long letter to the Southland Times, suggested that the call of the hakawai was "likely to be produced by one of the larger shearwaters who are celebrated for the weird noises they make". The only large shearwater known to breed on the islands off Stewart Island is the Sooty Shearwater (muttonbird), which is ruled out of contention by its vast numbers and wide distribution.

The idea that the Stewart Island Snipe might be the hakawai was first suggested in an article in the Southland Times (Anon. 1931). Points in favour of the snipe were that related species overseas had an acoustic aerial display, and that the Stewart Island Snipe had a similar restricted distribution to the hakawai (although the historical distribution of the Stewart Island Snipe has not been investigated in depth previously). However, the hakawai had not been reported from the other New Zealand island groups with snipe: The Snares, Auckland, Antipodes and Chatham Islands (Fig. 1A), and many people considered the flying ability of the Stewart Island Snipe to be inadequate for such a display. Indeed, Guthrie-Smith (1936: 186) considered the Stewart Island Snipe to be flightless.

Moncrieff (1931) argued against snipe being the hakawai from her experience with Common Snipe (*Gallinago gallinago*). "Surely if the 'Hakawai' were a snipe it would have been located ere now, as snipe make a drumming noise during the breeding season early in the morning, at midday and occasionally on moonlight nights. They are day-birds and would have been observed flying during the daytime". After describing the calls of three Northern Hemisphere snipe species, she concluded that "although peculiar, the noises of the snipe tribe are none of them in the least awe-inspiring or reach the volume of sound attributed to the 'Hakawai'".

EVIDENCE FOR AERIAL DISPLAYING BY NEW ZEALAND SNIPE

Aerial displays are given by almost all the world's snipes and woodcocks (Tuck 1972, Sutton 1981, Kalchreuter 1982), yet the idea that New Zealand snipe do not have an aerial display is firmly entrenched. The first sentence describing New Zealand snipe in Tuck's monograph (p. 53) states that they "do not have nuptial flights", while *Coenocorypha* is not even mentioned in Sutton's review on aerial and ground displays of the world's snipes.

Evidence for aerial displaying by various forms of New Zealand snipe has accumulated since November 1982, when Don Merton (pers. comm.) heard essentially the same hakawai call on Mangere Island (Chatham Islands) as he had heard on Big South Cape Island in 1961. I studied Chatham Island Snipe on South East and Mangere Islands during November 1983 to January 1984 and in July 1986, and recorded three different kinds of aerial displays. All these displays were performed at night; the most spectacular display included both a vocal and a non-vocal component (Fig. 2A). This display was indeed hair-raising when I first heard it. The vocal component was a disyllabic call, repeated five times, identical to one of the ground displays given by territorial male Chatham Island Snipe (Fig. 2B). This was followed by a loud roar, similar to a jet passing overhead, as the bird swooped over the 6 m canopy at high speed. The non-vocal component of the call had three stacked bands (0.7 kHz, 0.9 kHz & 1.2 kHz) and lasted for about 1.5 seconds.

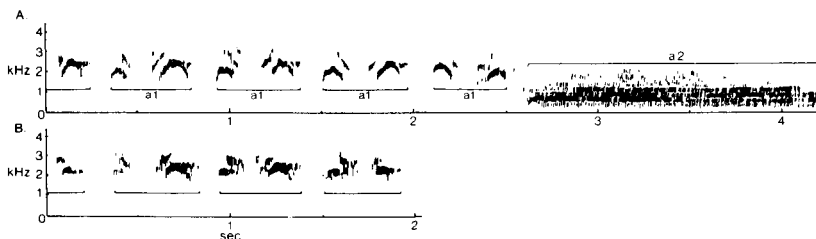


FIGURE 2 — Sonographs of displays by Chatham Island Snipe, recorded on South East Island, c.2330 h on 9 January 1984. The first syllable of both calls was not recorded. The two calls were given by different birds.

A. Aerial display, showing a series of five disyllabic vocal phrases (a1) followed by a non-vocal 'roar' (a2).

B. Ground display given by a male, showing the same song structure as in 'a1'.

As yet no-one has managed to see a Chatham Island Snipe perform the display, but high-flying snipe have been seen in spotlight beams on nights when birds have been displaying, and I have seen snipe performing a separate, purely vocal aerial display.

If this aerial display of Chatham Island Snipe is homologous with the 'drumming' or 'bleating' of *Gallinago* snipes, the non-vocal part of the call is likely to be created by air currents making the tail feathers vibrate as the bird dives at speed. I found indirect evidence of this on two of the 24 adult

male snipe that I handled on South East Island in November 1983-January 1984. Their tail feathers had unusual wear. The shafts of all 14 rectrices had snapped off about 5 mm from the tip, creating a V at the tip of each feather. I attribute this unusual feather wear to vibrational stress during the display. Other snipe species show tail wear caused by their aerial displays; male Wilson's Snipe (*G. gallinago delicata*) can be distinguished during the breeding season by their frayed tail feathers (Tuck 1972: 167, and see frontispiece in Sutton 1981).

The unusual wear of tail feathers described above can also be seen in museum specimens (Fig. 3). At least ten snipe skins in New Zealand museums show such wear: three or four from the Chatham Is, two from islands off Stewart I., four or five from the Auckland Is and one from Antipodes I. (Table 2). Table 3 gives how often I found tail wear among New Zealand snipe, separated by sex and by island group. As feather wear would be most pronounced before moult and specimens have been collected or handled throughout the year, I can draw little conclusion from tail-feather wear about the frequency of aerial displaying by the different snipe taxa. Note two points, however: this form of tail wear is found mainly in male snipe; and there is no evidence for such tail wear in Snares Island Snipe (*C. a. huegeli*).

The only evidence to date for aerial displaying by Auckland Island Snipe (*C. a. aucklandica*) is tail-feather wear in the four or five specimens given in Table 2, but I have since received corroborating evidence for aerial displaying by Antipodes Island Snipe (*C. a. meinerzhagenae*). D. S. Horning (pers. comm.), who was on Antipodes I. in December 1978, writes:

The bird was heard at dawn (before the sun came over the horizon) on Monday, 4 December 1978. I was sitting on some tussock at the cliff edge . . . [and witnessed] a snipe (from 20 m or so) diving. I took notice of it because I had not seen this behaviour at The Snares. It dived only three times that I saw – a very steep dive but not straight down. The bird did not make any calling sounds that I could hear and there was a wing rustle at the bottom of the dive. It then disappeared into the tussock and flew into the air again [about] 3-4 minutes later, repeating the dive. There was another bird involved, but I could not say [that] only one bird did the diving . . .

It is ironic that the most intensively studied population of New Zealand snipe – that on The Snares – is the only population for which there is no evidence for this form of aerial display. I have handled adult snipe 577 times on The Snares during 15 months of field work between December 1982 and February 1987 and have yet to hear the display or notice the characteristic tail-feather wear. I have, however, morphological and behavioural evidence that Snares Island Snipe have less flying ability than other New Zealand snipe.

WAS THE STEWART ISLAND SNIPE THE HAKAWAI?

Given the apparent extinction of both Stewart Island Snipe and hakawai, and the absence of tape-recordings of hakawai, it is not possible to test directly the hypothesis that the hakawai was the Stewart Island Snipe giving an aerial display. However, two avenues for investigation remain open: how do the geographical and historical distributions of hakawai and snipe compare, and how similar is the aerial display of the Chatham Island Snipe to human recollections of the hakawai?

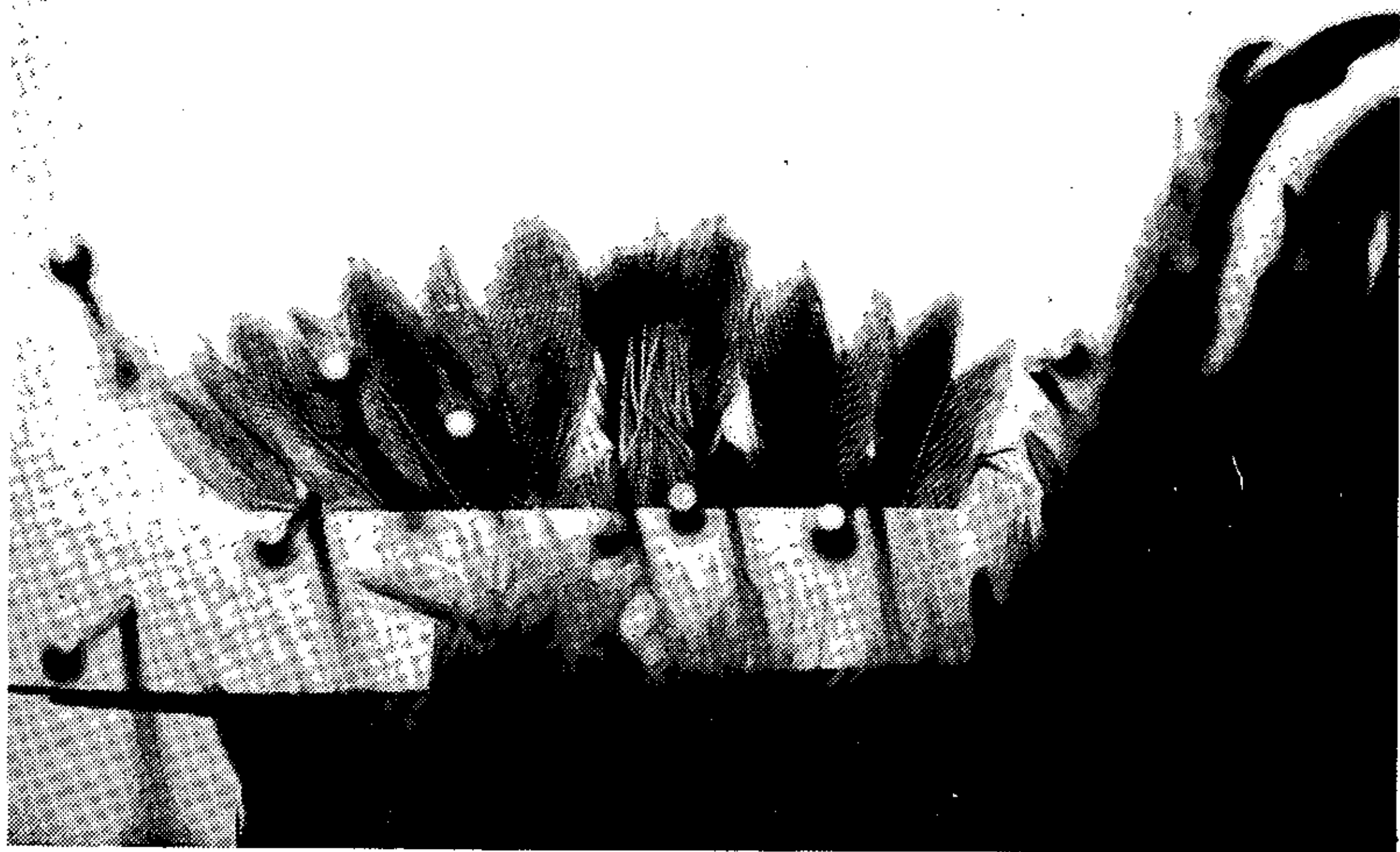


FIGURE 3 — Tail-feather wear in male Chatham Island Snipe (NMNZ DM 720) attributed to aerial displaying. The shafts of the rectrices have snapped near the tip.

TABLE 2 — New Zealand snipe specimens in New Zealand museums that show tail-feather wear attributed to aerial displaying. AIM = Auckland Institute & Museum; CM = Canterbury Museum; NMNZ = National Museum; OM = Otago Museum. AIM AV 77.4 and 78.9 may have suffered feather damage for reasons other than aerial displaying. OM A 07 101 seems to be incorrectly sexed.

Chatham Island Snipe (<i>Coenocorypha pusilla</i>)	CM AV 1804	♂	South East I.	[Dannefaerd/O'Connor]
	CM AV 2757	♂	Chatham Is	[O'Connor collection]
	NMNZ DM 720	♂	South East I.	1939
	AIM AV 78.9	♂	Chatham Is	[Dannefaerd]
Stewart Island Snipe (<i>C. aucklandica iredalei</i>)	CM AV 729	♂	"?Jackie Lees/Solomon"	[Stead collection]
	CM AV 732	♂	"?Jackie Lees/Solomon"	[Stead collection]
Auckland Island Snipe (<i>C. a. aucklandica</i>)	NMNZ DM 17515	♂	Adams I.	3 Jan 1973
	NMNZ DM 17516	♂	Adams I.	30 Dec 1972
	NMNZ DM 17517	♂	Adams I.	30 Dec 1972
	OM A 07 101	"♀"	Auckland Is	March 1907
	AIM AV 77.4	-	[no data, poor condition]	
Antipodes Island Snipe (<i>C. a. meinertzhagenae</i>)	NMNZ DM 14538	♂	Antipodes I.	4 Feb 1969

TABLE 3 — The frequency of tail-feather wear attributed to aerial displaying found in New Zealand snipe

		MALES		FEMALES	
		No. handled	No. with tail wear	No. handled	No. with tail wear
<i>C. pusilla</i>	live (South East I.)	36	2	39	1
	museum skins	36	3(?)	36	0
	TOTAL	72	5(?)	75	1
<i>C. a. iredalei</i>	museum skins	4	2	3	0
<i>C. a. huegeli</i>	live	320	0	257	0
	museum skins	7	0	6	0
	TOTAL	327	0	263	0
<i>C. a. aucklandica</i>	museum skins	7	3(?)	15	(?)
<i>C. a. meinertzhagenae</i>	museum skins	5	1	4	0

I. HISTORICAL DISTRIBUTION OF SNIPE ON MAINLAND NEW ZEALAND AND ADJACENT ISLANDS

The only islands from which there are documented skins of Stewart Island Snipe are Jacky Lee I., where Travers collected the type specimens of *C. a. iredalei* in 1897, and Big South Cape I. (two skins in NMNZ collected September 1964). Six skins collected by E. F. Stead and held at Canterbury Museum are labelled “? Jacques Lees/Solomon”. These skins are probably from Big South Cape I., as there is no record of Stead finding snipe on Jacky Lee or Solomon Is (Stead 1932, Wilson 1959); Stead collected eight eggs of *C. a. iredalei*, now in Canterbury Museum, on Big South Cape I. in December 1931.

Guthrie-Smith was deliberately vague when describing where he had seen snipe. In 1936 he wrote (p. 175) “. . . I knew [snipe] to be resident on many of the small islands east of Half Moon Bay; I had seen specimens of them on former expeditions”, yet he does not mention snipe in his 1914 book describing his experiences on Herekopare, North and ‘neighbouring’ islands.

The distribution of Stewart Island Snipe, South Island Snipe (*C. a.* subsp.) and North Island Snipe (*C. a. ?barrierensis*) given below was composed from the scant information in the literature, conversations and correspondence with muttonbirders, and from subfossil remains held in New Zealand museums. Refer to Fig. 1 for the location of the various islands.

A. The islands off the south-west coast of Stewart Island

Big South Cape Island

The last official record of Stewart Island Snipe was of two birds captured by NZ Wildlife Service staff on Big South Cape I. on 30 August 1964 (Bell, B. D., Southern islands bird transfer expedition, August-September 1964. Unpubl. report NZ Wildlife Service) during a bid to save vulnerable bird species from a plague of ship rats. These two birds died before they could be moved to another island and are now in the National Museum. Two muttonbirders have reported sightings of snipe on Big South Cape I. in 1965, 1978 and 1984.

Guthrie-Smith (1936: 181) saw snipe on Big South Cape I. (which he called by the fictitious name Kaipara) during an hour ashore in late December 1913. The snipe were in "the woodlands" (i.e. near the coast) and Guthrie-Smith was not aware of weka being present. In November 1923 weka were plentiful, apparently having been liberated during the ensuing decade (Guthrie-Smith 1936: 182). Snipe were found only on the heights and burnt-out centre of the island, whereas weka were confined to "the fertile bush and luxurious undergrowth" of the coastal fringe.

Stead and Wilson saw snipe "above the bush line" on Big South Cape I. in December 1931 (Wilson 1959: 49) and found "a good number" of weka. Richdale (no date a) found few weka and few snipe in January 1945, but did see one weka well above the bushline. Bell & Merton (unpubl.) saw only one snipe during a month's stay in April 1961.

Solomon Island

Wilson (1979: 81) and Bell (1978) recorded snipe as formerly occurring on Solomon I. Bell misquoted Guthrie-Smith (1925), who did not mention seeing snipe on Solomon I. (for which he invented the name Kotiwhenu). Guthrie-Smith in 1913 and Stead and Wilson in 1931 had to travel across to Big South Cape I. from Solomon I. to view snipe.

Pukeweka

Pukeweka is a small islet (c. 1.5 ha) lying between Solomon and Big South Cape Is. Phillip Smith (pers. comm.) had seen snipe on Big South Cape I and Pukeweka before the rat plague. Pukeweka has been suggested as the site where ship rats got ashore in the South Cape group, before spreading to neighbouring Big South Cape and Solomon Is in 1963.

Little Moggy Island (Moki-iti)

Patu King (pers. comm.) reports having seen snipe on Little Moggy Island, which lies 500 m north-east of Big Moggy I., and he suspects that they could still be there. Little Moggy I. is thought to be rodent free, but weka were "plentiful" in March 1965 (Blackburn 1965). Snipe were not seen in March 1965 (B. D. Bell, pers. comm.).

Kundy Island

Oliver (1930) and Richdale (no date b) gave Kundy as one of the islands where snipe occurred, although Oliver (1955) excluded this locality without comment from the second edition of *New Zealand Birds*. Neither author indicated the source of the record. Stead and Wilson visited Kundy I. for

a month in November 1929 (some 18 years before weka were introduced – R. Trow, pers. comm.) but did not record snipe. Russel Trow, whose family have been muttonbirding on Kundy I. since 1905, was not aware of snipe having been there.

B. Solander Islands

Falla (1948) heard a “snipe-like call” on unmodified Little Solander Island during a brief landing on 20 July 1948. I found no evidence of snipe during two days on the island in July 1985 (Cooper *et al.* 1986).

C. The islands off the north-east coast of Stewart Island and in Foveaux Strait

Herekopare Island

Harold Ashwell and Alan Skerrett both told me of the former occurrence of snipe on Herekopare Island, although the three people who had heard *hakawai* on Herekopare could not recall seeing snipe there. Snipe are presumed to have died out in the mid-1920s after cats were introduced and weka reintroduced.

It is possible that Guthrie-Smith saw snipe on Herekopare and/or Jacky Lee Is in 1911, as he stated that he had seen snipe on islands off Half Moon Bay (1936: 175). The absence of references to snipe in *Mutton Birds and Other Birds* (1914) may be part of the deception intended by the use of the fictitious names Kaipara and Kotiwhenu for Big South Cape and Solomon Is. While Guthrie-Smith’s motive for deception – to protect the birds and islands from those who would exploit them – is beyond reproach, the net result 70 years later is an unnecessary knot in the tangle of intrigue surrounding snipe and *hakawai*.

Jacky Lee Island

I presume weka were absent from Jacky Lee Island when H. H. Travers collected snipe there in March and October 1897 and April 1901. Muttonbirding ceased in 1929, three years before the visit by Stead and Wilson (Wilson 1959: 59). Weka were “very plentiful” in December 1932. Wilson (p.60) wrote: “We found no trace of the snipe which had been reported from the Jacques Lees; but from the number of wekas we saw and their predatory habits it was evident that, if snipe had inhabited the island, they could not have survived long after the wekas had arrived”. Eight years later weka numbers had “increased tremendously” and had decimated Diving Petrel and prion populations (Wilson 1959: 101-102).

Ruapuke Island

Billy McQuarrie informed me of old reports of snipe on Ruapuke Island; this is confirmed by subfossil remains in the Canterbury Museum.

Native Island

This small island is in Paterson Inlet (Fig. 1C). A part clavicle of *Coenocorypha* from a ‘moa-hunter midden’ on Native Island is in the Canterbury Museum.

D. The main islands of New Zealand

Stewart Island

Subfossil remains of snipe collected at The Neck (southern entrance of Paterson Inlet) are in Canterbury Museum.

South Island

Bones of *Coenocorypha* have been found in dune deposits at Marfell's Beach, Marlborough (Scarlett 1979) and in caves near Karamea, Punakaiki, Waipara, Timaru and Te Anau. Given the distribution and degree of subspeciation of *C. aucklandica*, it is likely that the South Island held a distinct subspecies. However, the presumed range of *C. a. iredalei* reached within 12 km of the South Island coast (at Ruapuke I.). Unless consistent differences are found between bones of South Island and Stewart Island Snipe, I suggest that all should be referred to *C. a. iredalei*.

North Island

On 30 August 1820 Major Richard Cruise shot a snipe on Motukorea Island (Browns I.) in Hauraki Gulf. He wrote (Cruise 1823: 225): "[the snipe was] the only one that any of us had seen in this country: in its plumage it resembled those found in England, but the bird itself was much smaller". The only existing snipe skin from the North Island region was taken on Little Barrier Island (Hauraki Gulf) in 1870 (Hutton 1871; see discussion in Turbott 1961). Although this unique specimen was named the Little Barrier Snipe (*C. a. barrierensis*) by Oliver (1955), Little Barrier I. was probably merely the final refuge of the North Island Snipe, which is known from subfossil deposits in the King Country, Hawke's Bay and Wairarapa (Medway 1971, Paulin 1973, Milliner 1981, Horn 1983). Thus, North Island records of *Coenocorypha* should be referred to *C. a. barrierensis* in the absence of evidence to the contrary.

Table 4 compares the historical distributions of snipe and hakawai around mainland New Zealand and offshore island groups. Given the uncertainties of the data set, both geographical distribution and the decline over time agree surprisingly well between snipe and hakawai. Snipe were known from five of the seven acceptable 'hakawai' islands off Stewart Island, and hakawai were known from five of the six 'snipe' islands. On most islands the decline of the hakawai is better known than that of snipe, probably because observers took more notice of hearing the hakawai. The isolated records of hakawai from Kundy and Big Moggy Is suggest that there was some movement between islands.

On Big South Cape I. even the habitat preference of snipe and hakawai agree (at least after the introduction of weka), both being found in the central pakihi areas of the island.

II. RESPONSE TO TAPE OF AERIAL DISPLAY OF CHATHAM ISLAND SNIPE

On playing a tape recording of the aerial display of Chatham Island Snipe represented in Fig. 2A, I had a response from ten people who had heard the hakawai in the previous 20-60 years. Seven of the observers had heard the hakawai on Big South Cape I. as recently as the early 1960s, and three had last heard it on Herekopare I. in the 1920s.

Four people (including B. D. Bell and D. V. Merton of the NZ Wildlife Service) thought the tape to be a fair representation of the hakawai's call. The three others from Big South Cape I. did not think that the tape was the hakawai, but considered it the nearest likeness to the call of the hakawai

that they had heard. Differences stressed (independently) were that the vocal component *hakawai*, *hakwai* . . . was too high pitched and "not human enough" on the tape. All three said that the non-vocal 'roar' reminded them of the *hakawai*. Note that none of these first seven considered the *hakawai* to sound like a chain rattle.

The three observers from Herekopare did not recognise the tape recording, and again stressed the human-like sound of the bird calling out its name. Two emphasised the chain rattle description for the non-vocal component. It is a shame that none of these people had heard the *hakawai* on Big South Cape I. Did the call differ from island to island, or was I expecting too much from recollections of 60 years ago?

TABLE 4 — The distribution and decline of *hakawai* and snipe on the main islands of New Zealand and adjacent offshore islands. Islands given in bold type are considered to have held *hakawai* and/or snipe in the last 100 years. See text for authenticity of records.

Locality	Approximate date of disappearance	
	Hakawai	Snipe
Big South Cape	1960s (possibly surviving)	1960s (possibly surviving)
Pukeweka	—	1960s
Solomon	1930s	?1930s (irregular)
Poutama	1930s	—
? Kundy	?1920s	?1920s
? Little Moggy	—	possibly surviving
? Big Moggy	?1940s	—
? Little Solander	after 1950	after 1960
Jacky Lee	1920s	1920s
Herekopare	1920s	1920s
Ruapuke	late 1800s	late 1800s
Green	late 1800s	—
Native	—	subfossil
Stewart Island	?late 1800s	subfossil
South Island	late 1800s (southern coast)	subfossil
Little Barrier	—	1870s
Motukorea	—	1820s
North Island	pre-1800 (Bay of Plenty)	subfossil

CONCLUSION

Many pieces of the *hakawai* puzzle are missing, probably forever, and other pieces have been shoe-horned into place, but all the available evidence indicates that the *hakawai* of the southern muttonbird islands was an aerial display of Stewart Island Snipe. Further north, away from the last refuge

of 'mainland' snipe, memories of the awe-inspiring nocturnal call of the unseen hakawai appear to have been blended with traditional recollections of a fearsome diurnal presence, perhaps the extinct eagle *Harpagornis*.

Some of the differences described between the call of the hakawai and the tape recording of an aerial display of the Chatham Island Snipe may be due to differences in body size. The Stewart Island Snipe is estimated to have weighed 30% more than the Chatham Island Snipe (mean male bodyweight 76 g; Fig. 4), and so its call may have had a lower pitch. Territory calls given from the ground by Chatham Island Snipe are markedly higher pitched than homologous calls given by Snares Island Snipe (mean male bodyweight 103.5 g).

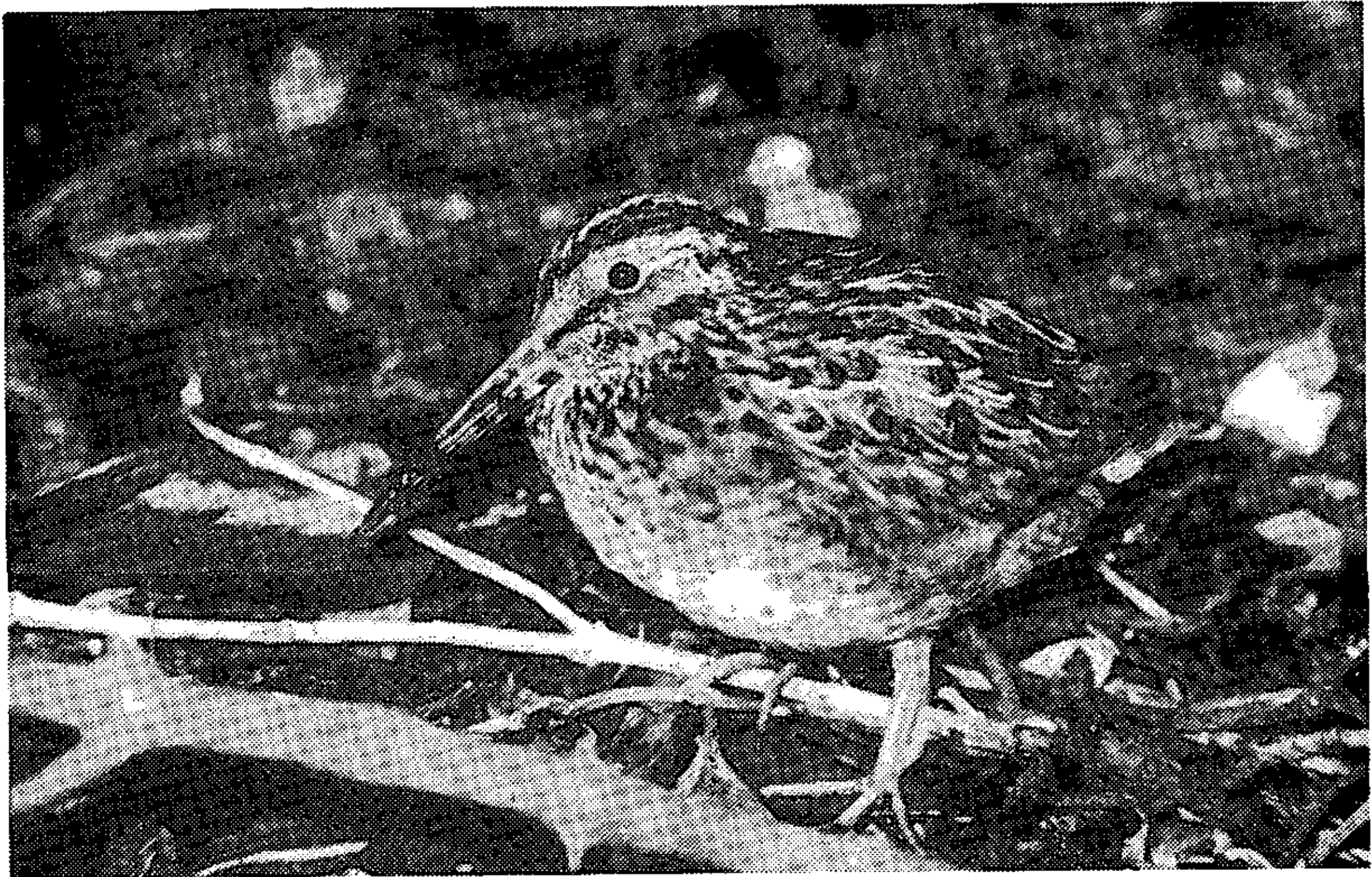


FIGURE 4 — Male Chatham Island Snipe — the unpretentious source of a legend?

The characteristic tail-feather wear described for New Zealand snipe is, in my opinion, caused by vibrational stress during aerial display. Non-vocal acoustic displays produced by flight feathers are known for two New Zealand honeyeaters (Craig 1984 & 1985, Onley 1986). Structural modifications to the outer primaries of Tui (*Prosthemadera novaeseelandiae*) and Bellbirds (*Anthornis melanura*) are thought to be the cause of whirring produced in flight; whereas modification to snipe rectrices is thought to result from their aerial display. If the amount of wear affects the quality of sound produced during the display, this may account for different descriptions of the non-vocal component of the hakawai's call.

If we can accept that the hakawai was a nocturnal display of Stewart Island Snipe, our knowledge of the recent distribution of the snipe is extended. Islands thought to have held Stewart Island Snipe in the last 100 years are Big South Cape, Pukeweka, Solomon, Poutama, Jacky Lee, Herekopare, Ruapuke and Green Is. Isolated records of hakawai from Kundy

and Big Moggy Is suggest that there was some movement between islands. The disappearance of snipe from these islands can be attributed to ship rats (Big South Cape and Pukeweka Is), weka (Solomon, Poutama, Jacky Lee and Green Is) and a combination of weka and cats (Herekopare and probably Ruapuke Is). What about those islands which, from their size, location and vegetation, should have held snipe, but from which there are no records: Putauhinu, Codfish, Edwards and Bench Is? Putauhinu has had kiore and cats, Codfish I. has kiore and weka, Edwards I. has weka, and Bench I. has Norway rats and weka. The inference is that Stewart Island Snipe cannot last in the presence of cats or any species of rat and may be wiped out by weka. The successful reintroduction of Chatham Island Snipe to Mangere Island by the NZ Wildlife Service in 1970 and 1972 adds support to these conclusions; snipe had disappeared after cats were introduced in the 1890s (the cats had died out by 1960). That snipe survived on Big South Cape I. in the presence of weka could be explained by the large size of the island, the diversity of habitats, and the very effective control of the weka by muttonbirders. These conclusions place severe constraints on what islands can be used for relocating snipe.

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LITERATURE CITED

- ANONYMOUS, 1931. A mystery bird. *Southland Times*: 8 June p. 6.
- ATKINSON, I. A. E. 1978. Evidence for effects of rodents on the vertebrate wildlife of New Zealand islands. Pages 7-30 in Dingwall, P. R.; Atkinson, I. A. E.; Hay, C. (eds.) *The Ecology and Control of Rodents in New Zealand Nature Reserves*. Dept Lands & Survey Inf. Ser. 4.
- ATKINSON, I. A. E. 1985. The spread of commensal species of *Rattus* to oceanic islands and their effects on island avifaunas. Pages 35-81 in Moors, P. J. (ed.) *Conservation of Island Birds*. Int. Council for Bird Protection, Tech. Publ. 3.
- BEATTIE, H. 1954. Our Southernmost Maori. *Dunedin: Otago Daily Times and Witness Newspapers Co.*
- BELL, B. D. 1978. The Big South Cape Islands rat irruption. Pages 33-40 in Dingwall, P. R.; Atkinson, I. A. E.; Hay, C. (eds.) *The Ecology and Control of Rodents in New Zealand Nature Reserves*. Dept Lands & Survey Inf. Ser. 4.
- BEST, E. 1924a. *The Maori*. Wellington: Tombs
- BEST, E. 1924b. *The Maori As He Was: a Brief Account of Maori Life in Pre-European Days*. Wellington: Dominion Museum.

- BEST, E. 1942. Forest Lore of the Maori. Wellington: Polynesian Society & Dominion Museum.
- BEST, E. 1982. Maori Religion and Ethology. Part 2. Wellington: Government Printer.
- BLACKBURN, A. 1965. Muttonbird islands diary. *Notornis* 12: 191-207.
- COOPER, W. J.; MISKELLY, C. M.; MORRISON, K.; PEACOCK, R. J. 1986. Birds of the Solander Islands. *Notornis* 33: 77-89.
- CRAIG, J. L. 1984. Wing slots, wing noise and aggressive asymmetries in New Zealand honeyeaters. *NZ J. Zool.* 11: 195-200.
- CRAIG, J. L. 1985. Wing slots of bellbirds *Anthornis melanura* (Aves: Meliphagidae). *NZ J. Zool.* 12: 431-432.
- CRUISE, R. A. 1823. Journal of a Ten Months' Residence in New Zealand. London: Longman.
- DEMPSEY, G. 1967. The Spell of Stewart Island. Wellington: Reed.
- EDWARDS, C. 1954. South with the mutton-birds! *NZ Home Journal*, April: 50-53.
- FALLA, R. A. 1948. Birds of the Solanders. *NZ Bird Notes* 3: 52-55.
- FITZGERALD, B. M.; VEITCH, C. R. 1985. The cats of Herekopare Island, New Zealand; their history, ecology and affects [sic] on birdlife. *NZ J. Zool.* 12: 319-330.
- GREY, G. 1872. Description of the extinct gigantic bird of prey hokioi. *Trans. Proc. NZ Inst.* 5: 435.
- GUTHRIE-SMITH, H. 1914. Mutton Birds and Other Birds. Christchurch: Whitcombe & Tombs.
- GUTHRIE-SMITH, H. 1925. Bird Life on Island and Shore. Christchurch: Whitcombe & Tombs.
- GUTHRIE-SMITH, H. 1936. Sorrows and Joys of a New Zealand Naturalist. Dunedin: Reed.
- HAAST, J. 1873. On *Harpagornis*, an extinct genus of gigantic raptorial birds of New Zealand. *Trans. Proc. NZ Inst.* 6: 62-75.
- HENDERSON, J. 1981. The Exiles of Asbestos Cottage. Auckland: Hodder & Stoughton.
- HORN, P. L. 1983. Subfossil avian deposits from Poukawa, Hawke's Bay, and the first record of *Oxyura australis* (Blue-billed Duck) from New Zealand. *J. Roy. Soc. NZ* 13: 67-78.
- HUTTON, F. W. 1871. [Comments on a snipe from Little Barrier Island]. *Trans. Proc. NZ Inst.* 3: 86.
- IMBER, M. J. 1975. Petrels and predators. *XII Bulletin Int. Council for Bird Preservation*: 260-263.
- JENKIN, R. 1970. New Zealand Mysteries. Wellington: Reed.
- KALCHREUTER, H. 1982. The Woodcock. Mainz: Verlag Dieter Hoffman.
- McNAB, R. 1907. Murihiku and the Southern Islands. Invercargill: Smith.
- MEDWAY, D. G. 1971. Sub-fossil avian remains from the Awakino-Mahoenui area. *Notornis* 18: 218-219.
- MILLINER, P. R. 1981. The quaternary avifauna of the North Island, New Zealand. Unpubl. PhD thesis. University of Auckland.
- MONCRIEFF, P. 1931. Snipe-cries and petrel calls. *Southland Times*: 28 June p.3.
- NATIVE. 1931. The Hakawai. *Southland Times*: 14 June p.3.
- NGATA, A. T. 1961. Nga Moteatea. Part II. Wellington: Reed.
- NGATA, A. T. 1970. Nga Moteatea. Part III. Wellington: Polynesian Society.
- OLD TIMER. 1931. The Hakawai. *Southland Times*: 28 July p.3.
- OLIVER, W. R. B. 1930. New Zealand Birds. Wellington: Fine Arts.
- OLIVER, W. R. B. 1955. New Zealand Birds. 2nd edn. Wellington: Reed.
- ONLEY, D. J. 1986. A method of ageing the Tui (*Prosthemadera novaezelandiae*) and its use in assessing body measurements. *Notornis* 33: 45-49.
- PAULIN, C. D. 1973. Sub-fossil avian remains from two limestone caves in North Taranaki. *Mauri Ora* 1: 95-98.
- PIO, H. 1901. Te manu aute. *J. Polynesian Soc.* 10: 191-193.
- REED, A. W. 1961. Myths and Legends of Maoriland. 3rd edn. Wellington: Reed.
- REED, A. W. 1963. Treasury of Maori Folklore. Wellington: Reed.
- RICHDALÉ, L. E. [no date a]. Vanishing New Zealand Birds. No. 5 of his series. Dunedin: Otago Daily Times and Witness Newspapers Co.
- RICHDALÉ, L. E. [no date b]. New Zealand Waders, Terns and Gulls. Vol. II. No. 12 of his series. Dunedin: Otago Daily Times and Witness Newspapers Co.
- SCARLETT, R. J. 1979. Avifauna and man. Pages 75-89 in Anderson, A. (ed.) *Birds of a Feather*. NZ Archaeological Assoc. Monogr. II. Brit. Arch. Rep. Int. Ser. 62.
- STEAD, E. F. 1932. The Life Histories of New Zealand Birds. London: Search.
- SUTTON, G. M. 1981. On aerial and ground displays of the world's snipes. *Wilson Bulletin* 93: 457-477.
- TAYLOR, R. H. 1978. Distribution and interactions of rodent species in New Zealand. Pages 135-141 in Dingwall, P. R.; Atkinson, I. A. E.; Hay, C. (eds.) *The Ecology and Control of Rodents in New Zealand Nature Reserves*. Dept Lands & Survey Inf. Ser. 4.
- THOMAS, B. W. 1982. A review of the herpetofauna of southern New Zealand with some taxonomic considerations. *Herpetofauna* 14: 22-34.
- TREGEAR, E. 1897. The Maori-Polynesian Comparative Dictionary. Christchurch: Whitcombe & Tombs.
- TUCK, L. M. 1972. The Snipes: a Study of the Genus *Capella*. Can. Wildl. Serv. Monogr. No. 5. Ottawa, Canada.
- TURBOTT, E. G. 1961. Birds. Pages 136-175 in Hamilton, W. M. (ed.) *Little Barrier Island (Hauturu)*. 2nd edn. NZ DSIR Bull. 137.
- URUMOTU, T. K. T.; KEREHOMA. 1872. Ki a Rihari Wunu. *Te Waka Maori* 8: 155.
- WATTERS, W. A. 1963. Notes on birds on Ruapuke Island, Foveaux Strait. *Notornis* 10: 305.
- WHITE, J. 1885. Maori customs and superstitions. In Gudgeon, T. W. *The History and Traditions of the Maoris*. Auckland: Evening Star.

- WHITE, J. 1887. The Ancient History of the Maori, his Mythology and Traditions. Vol. I. Wellington: Government Printer.
- WILLIAMS, H. W. 1971. A Dictionary of the Maori Language. 7th edn. Wellington: Government Printer.
- WILSON, E. 1979. Titi Heritage: the Story of the Muttonbird Islands. Invercargill: Craig.
- WILSON, R. A. 1959. Bird Islands of New Zealand. Christchurch: Whitcombe & Tombs.

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SHORT NOTE

A Caspian Tern feeding on the ground

On 11 May 1985, while at Manawatu River estuary, Foxton Beach, I observed a Caspian Tern (*Hydroprogne caspia*) foraging on the ground. The weather had been stormy for the previous few days and heavy squalls were still frequent.

When I saw the solitary tern through my telescope, my attention was drawn to its unusual feeding behaviour. It was feeding much in the manner of Red-billed Gulls (*Larus novaehollandiae scopulinus*), walking across the mud pecking and probing. I watched it for about 15 minutes as it wandered around a small area, seeming to find plenty of food. It was too distant and the light too poor for me to tell what food was being taken, but whatever it was, it seemed to be plentiful.

Shallow pools were on the mud, and twice I saw the tern foot-paddle in the pools, presumably to stir up small invertebrates, but conceivably to wash mud from its feet. The tern was feeding alone.

R. G. Bijlsma (*British Birds* 78: 146-147) observed the foraging behaviour of Caspian Terns in Egypt in October 1981. He recorded that "sometimes they hunted the shore by walking short distances but this hunting method was comparatively rarely observed," but he gave no description of this hunting method. In an added comment, E. K. Dunn said that "ground foraging by this species is especially interesting and not recorded before in the literature."

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