

Discovery of a previously unknown *Coenocorypha* snipe in the Campbell Island group, New Zealand subantarctic

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Abstract A previously unknown population of *Coenocorypha* snipe was discovered on Jacquemart Island, a rat-free 19 ha islet adjacent to Campbell Island in the New Zealand subantarctic, on 9 November 1997. This was the first evidence of *Coenocorypha* snipe occurring in the Campbell Island group, which is believed to have been infested by Norway rats (*Rattus norvegicus*) before the first naturalists visited in 1840. Rats were eradicated from 11,268 ha Campbell Island by the New Zealand Department of Conservation in July 2001. Two snipe were seen, and one caught, on Campbell Island adjacent to Jacquemart Island on 10 March 2005. The bird caught was a fully-feathered chick, indicating successful breeding on Campbell Island. The Campbell Island snipe remains undescribed and critically endangered.

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INTRODUCTION

Campbell Island (11,268 ha; 52°33'S, 169°08'E) is, in many respects, the most thoroughly studied of New Zealand's subantarctic islands. The island was inhabited continuously from 1941 to 1945 by coastwatching parties during the Second World War (Kerr 1976; Turbott 2002), and a meteorological station there was permanently staffed from 1945 to 1995 (Turbott 2002). Many of the personnel assigned to these teams were trained naturalists, or participated in ornithological research programmes during their time on the island (see Bailey & Sorensen 1962; Williams & Robertson 1996; Turbott 2002). The frequent ship visits to the

island, and the infrastructure developed at the meteorologist's Beeman Base, also made Campbell Island an accessible and appealing research site. As a result, the birds of the main island have been studied thoroughly (e.g., Westerskov 1960; Bailey & Sorensen 1962; Kinsky 1969; Moore 2004). However, the avifaunas of the smaller islets in the archipelago are very poorly known.

About a dozen small islands are scattered around the coast of Campbell Island (Fig. 1). The largest of these are Dent Island (23 ha), Jacquemart Island (19 ha), Isle de Jeanette Marie (11 ha), and Monowai Island (= Lion Rock; 8 ha). All four, and most of the smaller islands, remained free of the Norway rats (*Rattus norvegicus*) that are believed to have colonised Campbell Island in or before 1828 (Miskelly 2000). The first naturalists to visit Campbell Island arrived aboard HMS *Erebus* and HMS *Terror* in December 1840, and they commented

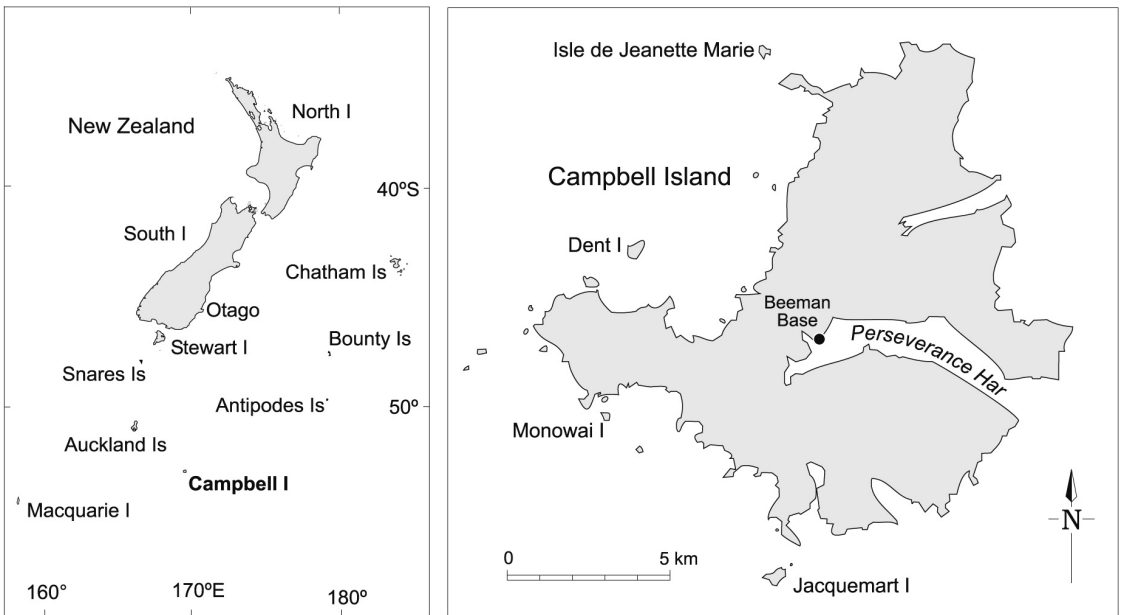


Figure 1. Campbell Island, showing locations mentioned in the text.



Figure 2. Jacquemart Island from the west (Photo: J. Carroll, Department of Conservation).

on the surprising absence of land birds on the island compared to the Auckland Islands that they had just departed (McCormick 1842). It is now apparent that the depauperate avifauna encountered in 1840 was due to the devastating impact of rats on the island's biota (Miskelly 2000).

The outlying islands in the Campbell Island group were early recognised as potential reservoirs for fauna and flora decimated or extirpated by rats, feral cats (*Felis catus*) and sheep (*Ovis aries*) on Campbell Island (Falla *in* Delacour 1956; Westerskov 1960; Bailey & Sorensen 1962). Evidence for vulnerable bird species persisting on the outlying islands included occasional reports of pipits

(*Anthus novaeseelandiae*) and Campbell Island teal (*Anas nesiotis*) on Campbell Island's coasts adjacent to offshore islands (Sorensen 1951; Westerskov 1960; Bailey & Sorensen 1962), and the frequency with which grey-backed storm petrels (*Oceanites nereis*) and subantarctic diving petrels (*Pelecanoides urinatrix exsul*) were attracted to lights at Beeman Base, or were seen near Campbell Island's coast (Bailey & Sorensen 1962; Kinsky 1969), when both these small petrels were believed to have been extirpated on the main island.

All the outlying islands are surrounded by frequently stormy seas, and some are so cliff-bound as to rule out landing from a boat (Fig. 2). Also, all are a long distance from Beeman Base at the head of Perseverance Harbour, increasing the small islands' inaccessibility. The first of the small islands to be landed on by a scientific party was Dent Island on 12 Nov. 1975, when Campbell Island teal were rediscovered (Williams & Robertson 1996). Jacquemart Island was first landed on (via helicopter) on 29 Dec. 1980 (Foggo & Meurk 1981). All four of the larger outlying islands were landed on in February 1984, and Dent Island was the focus of another three trips up to 1990 (one involving 6 separate visits in October–November 1990) during attempts to capture or study Campbell Island teal.

Three of the authors (DB, JC and JF), along with three trained bird-locator dogs, landed on all four of the islands in November 1997, with the hope of finding a further population of Campbell Island

teal. As with previous trips, teal were found only on Dent Island. However, while searching Jacquemart Island, the team made the serendipitous discovery of snipe (*Coenocorypha* sp.), described more fully below. These visits included the second landing on Isle de Jeanette Marie, and the third on Jacquemart and Monowai Islands. None of the islands has been visited since.

Exploration and ecology of Jacquemart Island

Jacquemart Island lies about 1 km off the south coast of Campbell Island. It is a sheer-sided remnant of eroded basaltic lava about 750 m x 500 m in basal area, and rising to a small summit plateau at about 200 m asl. Following the initial 1.5 h landing, Foggo & Meurk (1981) described the island's vegetation and fauna; the description below was supplemented by observations made by Andy Garrick, Colin Meurk and Trevor Crosby during 2.5 h ashore on 17 Feb. 1984 (Andy Garrick pers. comm.), and our own observations during 3 h ashore on 9 Nov. 1997.

The predominant vegetative cover on the upper slopes of Jacquemart Island is *Poa litorosa* tussock up to 1.4 m tall, growing on deep peat undermined by petrel burrows. The lower, steeper flanks have *Poa foliosa* tussock up to 0.6 m tall, with the megaherb *Stilbocarpa polaris* common in gullies. Below this zone, on the crests of the cliffs, the predominant vegetation is cushions of *Colobanthus muscoides* and mats of *Crassula moschata*. The commonest burrowing petrel is sooty shearwater (*Puffinus griseus*); grey-backed storm petrels are also present, and subantarctic diving petrel and prion (*Pachyptila* sp.) remains have been found in middens of the southern skua (*Stercorarius skua lomnbergi*). Skuas were conspicuous (8+ in 1997) and "numerous" nests were found on the south-east side of the island. Northern giant petrels (*Macronectes halli*) had chicks in 1980 (8 along summit ridge) and 1997 (22), and three light-mantled sooty albatross (*Phoebastria palpebrata*) chicks were seen on the south side of the island in 1997. Campbell Island shags (*Leucocarbo campbelli*) breed on the cliffs, and cape pigeons (*Daption capense*) may do (Foggo & Meurk 1981). Pipits were obvious and tame in 1980 and 1984, but were not recorded in 1997. The only other landbirds recorded were a flock of about 15 starlings (*Sturnus vulgaris*) in 1980, and snipe in 1997. Large invertebrates observed included the Campbell Island endemic weta (*Notoplectron campbellensis*) (1980, 1984) and endemic leaf-veined slug (*Pseudaneitea sorenseni*) (1984), both of which were very rare on Campbell Island in the presence of rats (Taylor 1986).

Rat eradication from Campbell Island

The discovery of a previously unknown relict population of snipe on Jacquemart Island in 1997

gave added impetus to the audacious proposal to eradicate Norway rats from Campbell Island. Feral cattle (*Bos taurus*) had been shot out in 1984 (Williams & Robertson 1996), the last sheep were shot in 1989-90 (Williams & Robertson 1996), and cats had apparently died out soon after 1984, although this was not realised for some years (Pete McClelland pers. comm. 1999). By 1997, Norway rats were the only introduced mammals remaining in the Campbell Island archipelago.

To remove the rats, cereal pellets containing 20 ppm brodifacoum were spread over all of Campbell Island by three helicopters in July 2001 (McClelland & Tyree 2002). This proved successful because follow-up monitoring in April-May 2003 revealed no evidence of rats, and none has been reported since.

Captive-bred Campbell Island teal were reintroduced to Campbell Island in September 2004 (Gummer *et al.* in press). A post-release monitoring team, including a bird-locator dog, were on Campbell Island in February-March 2005, and provided the second snipe encounter reported here.

METHODS

The 1997 survey team (DB, JC, JF, and dogs Bob, Gus, and Fiddich) were landed by helicopter on each island for up to 3 h as follows: Isle de Jeanette Marie 0700-0830 h on 9 November, Jacquemart Island 0845-1145 h on 9 November, Dent Island 3 h on the afternoon of 9 November, and Monowai Island 45 min on the morning of 10 November. All three dogs (and their handlers DB and JF) were experienced at locating brown teal (*Anas chlorotis*), and DB and Bob had encountered Auckland Island snipe (*Coenocorypha aucklandica aucklandica*) during work on Auckland Island teal (*Anas aucklandica*) in 1991 and 1996. The team worked through all accessible potential teal habitat on the islands, to determine whether teal were present. Tape-recorded teal calls were played on each island, but persistent winds gusting to 40 knots with intermittent snow, rendered these largely ineffectual. The very steep terrain on Jacquemart Island meant that generally only the upper slopes were surveyed.

In 2003, a team searching for rat presence (Fin Buchanan with "rat" dog Jak, Sandy King, Greg Lind, Jane Maxwell, Darren Peters, and Lindsay Wilson) were on Campbell Island from 26 April to 24 May. Among other rat monitoring methods, the dog team traversed as much of the island as possible, including the slopes around Monument Harbour and Six Foot Lake, and Eboulé (=Antarctic) Peninsula. Team members searched for rat sign wherever they travelled, including looking for footprints in mud.

The 2005 teal monitoring team (Hilary Aikman, Raelene Berry, HE, DB and dog Gus) were on Campbell Island from 20 February to 16 March.

As a Campbell Island teal had been reported from Six Foot Lake before captive-bred birds were released at the head of Perseverance Harbour in September 2004 (Pete McClelland pers. comm.), the team specifically searched the vicinity of Six Foot Lake twice. On 25 February the full team surveyed the western edge of Six Foot Lake. HE, DB and Gus went on to search the south-east and southern flanks of Eboulé Peak around Monument Harbour, and also Eboulé Peninsula. On 10 March HE, DB and Gus traversed the northern and western slopes of Puiseux Peak, across the outlet of Six Foot Lake, then up the western side of the lake.

RESULTS

The November 1997 team landed on the summit plateau of Jacquemart Island and descended to the upper slopes via a steep gully between lava outcrops surrounding the plateau. It was in this south-east facing gully that they first encountered a snipe. JF's dog Fiddich followed a bird for about 20 m around the base of a bluff before it flushed, rising to a height of 2-3 m, and flying for 15-20 m. After brief discussion, and realising the significance of the find, the team determined to catch a specimen to confirm identification. About 50 m below the first encounter, Fiddich pointed to a bird in *Poa foliosa*; it was surrounded, and then caught by JF, photographed (Fig. 3), and released about 5 min later.

The team continued their primary objective of searching for teal (unsuccessfully), making a clockwise traverse of the upper slopes of Jacquemart Island. Based on the behaviour of the three dogs, one or more snipe were encountered at a total of ten different locations over the next 2 h (two further snipe were seen). Both DB and JF noted that their dogs behaved differently when pointing snipe compared to teal; with snipe the dogs were more relaxed, and vibrated their tails at a slower rate than they did with teal. At two sites, groups of snipe probe holes were seen in mud.

After leaving Jacquemart Island, the team landed on Dent Island and then on Monowai Island; they had earlier landed on Isle de Jeanette Marie. Snipe were not encountered on any of these islands.

In May 2003, Fin Buchanan and Darren Peters found possible snipe footprints on the eastern side of Monument Harbour, about 2.5 km from Jacquemart Island. The footprints were found under a large *Dracophyllum scoparium* shrub among tussock at the edge of a sealion (*Phocarctos hookeri*) wallow (Darren Peters pers. comm.). The prints measured about 35 mm from the tip of the mid claw to the back of the foot, compared to about 34 mm for the same measurement for Snares Island snipe (*Coenocorypha aucklandica huegeli*; CM unpublished data). No other known bird species on Campbell Island would produce an unwebbed footprint of this size.

On 10 March 2005, Gus (the dog) first showed interest in a bird (either teal or snipe) in an area of tall tussock on boggy ground on the eastern side of Monument Harbour, apparently close to where the 2003 footprints were found (although DB and HE were unaware of the record at the time). As Gus could not be seen or followed in the dense vegetation, he was called back. Soon after crossing the outlet to Six Foot Lake, Gus picked up another scent, and a snipe was soon located by the team, and caught by HE (Figs. 4, 5). This bird called while being handled, and Gus indicated another bird nearby. The second bird was seen by DB and HE, who considered it to be noticeably larger than the bird caught. As female snipe are typically slightly larger than males (Higgins & Davies 1996), DB assumed that they had caught the male of a pair. However, when the only close-up photograph taken (Fig. 6) was viewed by CM, the bird was identified as a fully-feathered chick, distinguished from an adult by its swollen, smooth, purple-grey bill base (cf. slender, ridged and brown in adult snipe), and short bill. The bird weighed 85 g, the bill length was 47.4 mm, head & bill 74.9 mm, and tarsus 21.4 mm. Using growth equations calculated for Snares Island snipe chicks (Miskelly 1999), the measurements gave estimated ages for the chick of 32 days (weight), 35 days (bill length) and eight days (tarsus). The anomalously low age estimate based on the tarsus measurement may result from differences in measuring technique (note that Snares Island snipe have a mean tarsus length of 19.3 mm at hatching; Miskelly 1999), or Campbell Island snipe may have shorter legs than Snares Island snipe. Based on plumage development (Miskelly 1999), we suggest that this chick was at least seven weeks old, and therefore came from an egg laid before 29 Dec. 2004 (assuming incubation length of 22 days; Miskelly 1990a).

The bird was released after about 10 min. As weather conditions were deteriorating, no further searching was undertaken on 10 March, and the team left the island six days later.

DISCUSSION

What is the Campbell Island snipe?

Coenocorypha snipe are, in comparison with *Gallinago* snipe, morphologically diverse. Each of the surviving named taxa (Chatham Island snipe *C. pusilla*, Snares Island snipe, Auckland Island snipe, and Antipodes Island snipe *C. aucklandica meinertzhagenae*) plus the recently extinct Stewart Island snipe (*C. a. iredalei*), are highly distinctive in plumage markings and body shape (Higgins & Davies 1996; Holdaway *et al.* 2001; Worthy *et al.* 2002) to the extent that these authors all suggested that most or all named *Coenocorypha* snipe should have full species status. Given the morphological distinctiveness of each named *Coenocorypha*



Figure 3. The first Campbell Island snipe captured, Jacquemart Island, 9 Nov. 1997. (Photo: J. Carroll, Department of Conservation).



Figure 4. Six Foot Lake, Campbell Island, with Monument Harbour in the background. A = Location where possible snipe footprints were found in May 2003; B = Site where two snipe were found (and one caught) in March 2005 (Photo: D. Barker).

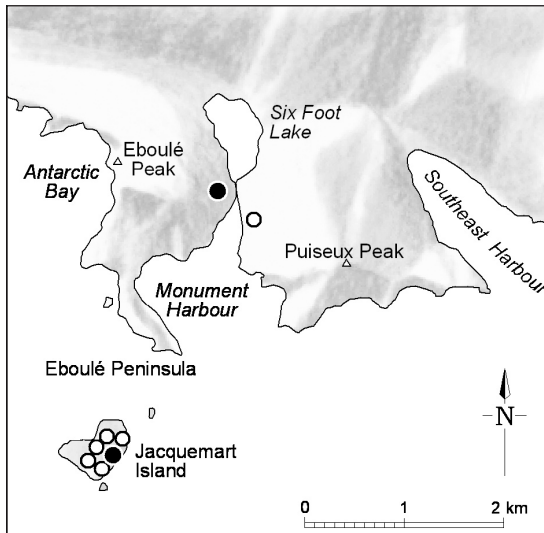


Figure 5. Locations where Campbell Island snipe have been captured (solid dots) or their presence inferred by the presence of footprints or probe holes, or by bird-lounger dog behaviour (open dots).



Figure 6. The Campbell Island snipe chick captured near Six Foot Lake on 10 Mar. 2005 (Photo: D. Barker).

population on their widely separated island groups, it is anticipated that the Campbell Island snipe will also prove to be morphologically (and genetically) distinct, and deserving separate taxonomic status.

Within *Coenocorypha* snipe, the two southernmost named taxa (*C. a. aucklandica* and *C. a. meinertzhagenae*) are morphologically most similar, sharing similar body shape (light build, relatively

long legs and bill) and plumage markings (Higgins & Davies 1996; Worthy *et al.* 2002) and differing mainly in overall plumage tone, and leg colour. It is clear from the photographs obtained of Campbell Island snipe that it is similar to both *C. a. aucklandica* and *C. a. meinertzhagenae*, as expected from the geographical proximity of the three island groups and their similar geological history,

landforms, and vegetation. Unfortunately none of the photographs clearly shows ventral markings, which are diagnostic for other *Coenocorypha* snipe.

Baseline genetic samples have been obtained from the four extant, named *Coenocorypha* snipe, and these show remarkably high levels of genetic divergence cf. *Gallinago* snipe (Allan Baker & Colin Miskelly unpublished data). Samples have yet to be obtained from Campbell Island snipe to allow comparison with related taxa.

Why did Campbell Island snipe persist solely on Jacquemart Island?

Snipe must have been present throughout the Campbell Island group before the introduction of Norway rats (Miskelly 2000), and there is little doubt that rats were solely responsible for the extinction of snipe on Campbell Island. The mystery is why snipe did not survive on 23 ha Dent Island, but did so on 19 ha Jacquemart Island. The two islands have broadly similar terrain and vegetation, but there are subtle differences in their flora and fauna. Dent Island is wetter, with less of the tall *Poa litorosa* tussock, and more megaherbs (*Stilbocarpa polaris*, *Bulbinella rossi* and *Anisotome latifolia*), and a burrowing petrel community in the wetter gullies dominated by the large white-chinned petrel (*Procellaria aequinoctialis*) (Williams & Robertson 1996). However, the habitat on Dent Island is very similar to that on parts of Disappointment and Adams Islands in the Auckland Island group, where snipe are abundant. We suggest that snipe would have been present on Dent Island 200 years ago, but that chance events wiped out the inevitably small population during the c.150 years between rats colonising Campbell Island and naturalists visiting Dent Island. Fortunately the relict snipe population on Jacquemart Island persisted long enough to outlast the rats on Campbell Island.

Conservation of Campbell Island snipe

The Campbell Island snipe must be one of the world's rarest birds. The 1997 team, surveying accessible, well-vegetated habitat on Jacquemart Island, had only 10 encounters, though it is possible that some of these were pairs of snipe, given the time of year. The total area of vegetation on the island is less than 18 ha, and we suggest that the number of snipe on the island is likely to be < 50 birds. Now, with rats eradicated from Campbell Island, snipe have the potential to re-occupy 100% of their presumed original range.

Snipe appear to be reluctant fliers, generally only doing so when flushed, or to perform nocturnal aerial displays (Miskelly 1987, 1990b, 2005). However, they do cross water gaps, e.g. Mangere Island to Little Mangere Island, and Rangatira Island to Pitt Island in the Chatham Islands (Higgins

& Davies 1996). Given the expected small size of the Jacquemart Island population, and the absence of any acceptable records from Campbell Island (Miskelly 2000), it was not expected that snipe would colonise Campbell Island at a sufficiently rapid rate to locate a mate and breed within four years of rat eradication. Presumably, therefore, many dozens of snipe must have attempted to colonise Campbell Island from Jacquemart Island over the preceding 170 years, and been killed by rats or cats before being detected by humans.

Monitoring of the population now establishing around Monument Harbour will help to determine whether birds are continuing to colonise, and whether successful recolonisation of Campbell Island may occur without management intervention. These surveys would also provide an opportunity to collect morphological data and genetic samples to allow comparisons with other *Coenocorypha* taxa.

Ecological restoration of Campbell Island

The successful eradication of rats from Campbell Island was a landmark in the conservation management of subantarctic islands globally. Already this achievement has allowed pipit (Thompson *et al.* 2005) and snipe to re-colonise Campbell Island, and for the reintroduction of Campbell Island teal to commence. During the February-March 2005 teal survey two grey-backed storm petrels were found on Eboulé Peninsula during the day by Gus the dog (DB pers. obs.) suggesting that some small petrels may also be recolonising naturally. However, the full extent to which rats impacted on the original avifauna of Campbell Island remains unclear and some bird species may have been exterminated before their presence was documented by naturalists.

Based on the range of habitats present on Campbell Island, compared to other nearby island groups (Auckland, Antipodes, Macquarie Islands), it is possible that the original non-seabird community of the island included New Zealand merganser (*Mergus australis*), New Zealand falcon (*Falco novaeseelandiae*), a rail (*Gallirallus* and/or *Dryolimnas*), a plover (*Charadrius* sp.), one or more parakeets (*Cyanoramphus* spp.), a tomtit (*Petroica macrocephala* subsp.) and bellbird (*Anthornis melanura*) in addition to teal, snipe and pipit. McCormick (1842) listed a merganser as occurring on Campbell Island, and falcon and banded dotterel (*Charadrius bicinctus* subsp. indet.) have occurred as vagrants (Bailey & Sorensen 1962). A parakeet bone was found recently on Campbell Island (Holdaway 2005), and at least one male bellbird was present at the head of Perseverance Harbour from February 2003 (David Thompson pers. comm.) to September 2004 (Pete McClelland pers. comm.). Further investigation of bone deposits on Campbell Island

may reveal further diversity in its prehuman avifauna, and contribute to the recreation of an avifauna similar to that which was present before the arrival of rats.

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