Notornis, 2023, Vol. 70: 135-138
0029-4470

SHORT NOTE

Long-distance dispersal by a *Coenocorypha* snipe

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Members of the family Scolopacidae (sandpipers and snipes) include some of the most extreme long-distance migrants known among birds (Conklin *et al*. 2017; Zhao *et al*. 2017). More than 60% of scolopacids breed in the Arctic and migrate to the Southern Hemisphere in the non-breeding season (Hayman *et al.* 1986; Higgins & Davies 1996). Among the record holders are eastern bar-tailed godwits (*Limosa lapponica baueri*) that migrate non-stop from Alaska to New Zealand, a distance of up to 11,690 km (Gill *et al.* 2005; Battley *et al.* 2012). Even this distance has recently been eclipsed by a godwit that flew 13,560 km non-stop from Alaska to Tasmania (Alaska Science Centre 2022).

At the other end of the dispersal spectrum, New Zealand's *Coenocorypha* snipes are among the most sedentary members of the family. Following a 5-year study of a colour-banded population of Snares Island snipe (*C. huegeli*), Miskelly (1999) reported a maximum dispersal distance of 350 metres for females, and only 260 metres for males. Longer dispersal distances have been reported for *Coenocorypha* snipe of four taxa moving between islands within an archipelago (Table 1). These records were based on unmarked birds found at sites where they were previously considered to be absent. However, until recently, these dispersal records involved minimum water crossings of no more than 2.5 km (Table 1).

We here report the first known record of a Chatham Island snipe (*C. pusilla*) on the main Chatham Island (Rēkohu / Wharekauri), other than the presence of subfossil bones there (Higgins & Davies 1996; Millener 1999). This recent record likely resulted from a bird flying across Pitt Strait, with a minimum water-crossing distance of 23.5 km (Fig. 1).

By about 1900, Chatham Island snipe were understood to be confined to Rangatira / South East

Received 14 April 2023; accepted 19 May 2023
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Island, following introduction of predatory mammals to the three other large islands in the Chatham Islands (Fleming 1939; Roberts & Miskelly 2003). Snipe were successfully reintroduced to Mangere Island from Rangatira in 1970 (Bell 1974). The birds on these two nature reserves are considered genetically indistinguishable (Baker *et al.* 2010), and both islands are likely sources for Chatham Island snipe that are occasionally seen on nearby Pitt Island (Higgins & Davies 1996; Roberts & Miskelly 2003; Table 1 & Fig. 1).

The 'main island' snipe was found freshly dead on the deck of the house at Durham farm (owners Gary & Eileen Cameron), about 0.7 km east of Stony Hill, south-west Chatham Island, on the morning of 7 May 2022. The bird had fresh soil on its bill, indicating that it had been probing for food shortly before it died. Necropsy revealed puncture wounds consistent with the bird having been killed by a domestic cat (*Felis catus*) (Noel Hyde *pers. comm*. to CMM). Preserved as a study skin and spread wing (Te Papa OR.031240), it was DNA-sexed as a male using the method of Griffith *et al*. (1998). Its adult plumage, dull yellow legs, and the small size of the only testis found (1.5 x 0.5 mm) indicated that it was a subadult. All primary and secondary flight feathers were fully grown and in fresh condition.

As this bird was found at an unexpectedly large distance from known snipe populations, we compared its mitochondrial (mtDNA) haplotype and nine variable microsatellite loci with reference

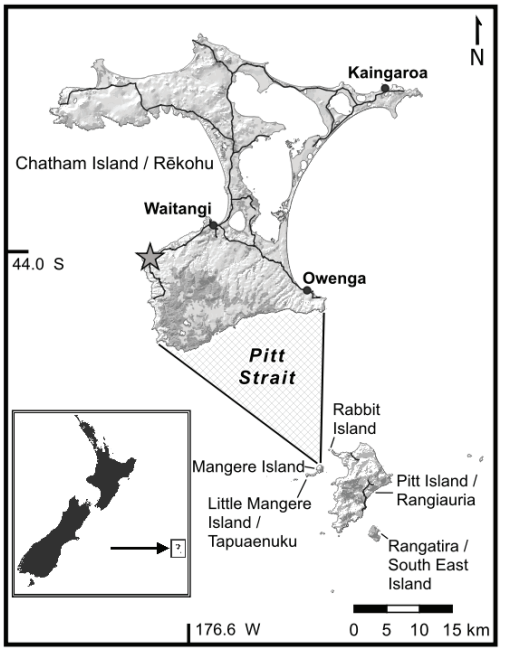

Figure 1. Map of the Chatham Islands, showing localities mentioned in the text. The location of Durham farm is shown by the star. The male snipe found dead there most likely came from Mangere Island (possibly via Rabbit Island), after a minimum water-crossing of 23.5 km and a minimum land-crossing of 12 km, with a minimum total distance travelled of 40 km.

Table 1. Dispersal records for four taxa of *Coenocorypha* snipe, based on detection of one or more birds at sites where they were previously considered to be absent. 'Max' = the direct line distance (km) from the shoreline of the nearest known potential source population to the site where the bird(s) was or were found. 'Min' = the longest water gap (km) that the bird(s) would have had to cross if the path with the shortest water crossing was followed. Data referring to the bird found on Chatham Island in May 2022 are in bold.

Taxon	Scientific name	Nearest population	Where detected	Max	Min	Source
Chatham Island snipe	***Coenocorypha pusilla***	Mangere Island	Little Mangere Island	0.5	0.3	Miskelly 1990
		Mangere Island	Rabbit Island	2.6	2.3	Miskelly, Bester *et al.* 2006
		Mangere Island	Northern Pitt Island	5.6	2.3	Te Papa OR.031242 (this paper)
		Mangere Island	**Chatham Island**	**40.3**	**23.5**	**Te Papa OR.031240 (this paper)**
		Rangatira	South-east Pitt Island	2.9	2.2	Higgins & Davies 1996
Snares Island snipe	*C. huegeli*	Putauhinu	Rerewhakaupoko	2.4	1.4	Tony Heaslip *pers. comm*. to CMM
		Kundy Island	Big Island	2.2	1.2	Russel Trow *pers. comm*. to CMM
Auckland Island snipe	*C. aucklandica aucklandica*	Ewing Island	Dundas Island	4.9	2.5	Miskelly *et al.* 2020
Campbell Island snipe	*C. a. perseverance*	Jacquemart Island	Campbell Island	2.6	0.9	Barker *et al.* 2005; Miskelly & Fraser 2006

data from other *Coenocorypha* snipe populations, to determine whether it had likely come from Rangatira or Mangere Island. The alternative hypothesis was that it was from an unknown population that had survived *in situ* in the presence of introduced mammals, as has recently been inferred for snipe on Rose and/or Enderby Islands in the Auckland Islands archipelago (Shepherd *et al.* 2020). We also included a subadult female snipe from northern Pitt Island in the genetic analyses (Te Papa OR.031242, found cat-killed at Rauceby homestead on 20 July 2022; Table 1). MtDNA sequencing and analysis followed Baker *et al.* (2010), and microsatellite genotyping and analysis followed Baker *et al.* (2010) and Shepherd *et al.* (2020). DNA sequences have been deposited in the GenBank repository (accession numbers OQ807039–OQ807040, OQ815888–OQ815891).

Both birds were genetically indistinguishable from Rangatira and Mangere birds. They both exhibited the most common mtDNA haplotype sequenced from these two populations (Fig. 2). Their microsatellite alleles all occurred in the Chatham Islands reference samples, and the same seven microsatellite loci were fixed as in previous samples (Baker *et al.* 2010). A STRUCTURE analysis (Pritchard *et al*. 2000) assigned both birds with high assignment probability (q = 0.99) to a cluster comprised of the Rangatira and Mangere Island reference samples. These genetic data support the hypothesis that the two birds had dispersed from either or both of the two known populations.

Assuming that the snipe had flown across Pitt Strait (Fig. 1), its arrival could not be explained by the immediately previous weather conditions, as there had been winds from a northerly quarter since the start of May 2022, with southerly winds on two days in late April (Timeanddate 2022).

Given previous understanding of the dispersal ability of *Coenocorypha* snipes (Table 1), a bird crossing Pitt Strait was an extraordinary event. Furthermore, the bird likely crossed at least 12 km of main Chatham Island before coming to grief at the second occupied house that it could potentially have encountered when heading north or north-west from the south coast (Fig. 1). While we do not know whether it spent much time on the ground on Chatham Island, it may have (briefly) benefited from extensive feral cat control undertaken to protect Chatham Island taiko (*Pterodroma magentae*) and parea (*Hemiphaga chathamensis*) in south-west Chatham Island (Imber *et al.* 1994; Aikman *et al.* 2001; Mike Bell & Dave Boyle *pers. comms* to CMM).

Chatham Island snipe have the lowest wing-loading of the five living *Coenocorypha* snipe taxa (Miskelly 1990; Miskelly, Bell *et al.* 2006), and male Chatham Island snipe have lower wing-loadings than females (P = 0.07; Miskelly, Bell *et al.* 2006). These data point to Chatham Island snipe having greater dispersal potential than other *Coenocorypha* snipe, and males as being the sex with the potential to fly furthest.

While this record may prove to be exceptional, it demonstrates that *Coenocorypha* snipe are more capable dispersers than is generally understood (Oliver 1955; Heather & Robertson 1996; Higgins & Davies 1996). Ancestral *Coenocorypha* snipe were even more capable dispersers, based on their presence on oceanic islands that required crossing water gaps of at least 730 km (i.e. the distance between Campbell Island and Antipodes Island, both of which are inhabited by populations of subantarctic snipe *C. aucklandica*).

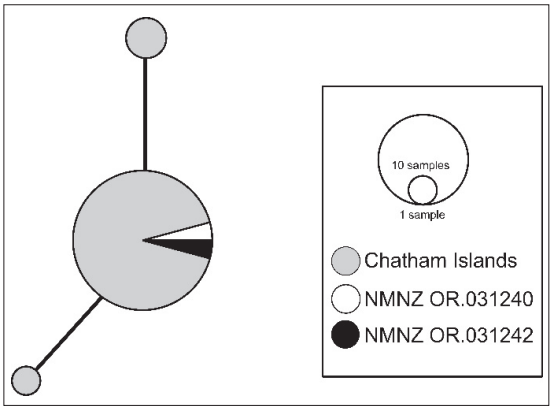

Figure 2. Median-joining network between mtDNA haplotypes of Chatham Island snipe. Each haplotype is separated by a single mutation and circle size is proportional to haplotype frequency. Chatham Islands = combined samples from Rangatira and Mangere Islands (see Baker *et al.* 2010); NMNZ OR.031240 = Chatham Island vagrant male; OR.031242 = Pitt Island vagrant female.

ACKNOWLEDGEMENTS

We thank Gary & Eileen Cameron and Dianne Gregory-Hunt for alerting the Department of Conservation (DOC) to the snipe specimens they found in 2022, and Erin Patterson, Dave Houston, and Jamie Cooper (DOC) for bringing them to our attention, and for their assistance with getting the specimens to Te Papa. Noel Hyde prepared the specimens, and provided information on their sex, age, and likely causes of death. We thank Tony Heaslip and Russel Trow for reporting sightings of Snares Island snipe, and Jaz Hamilton for preparing the map. This note benefitted from comments by reviewer Phil Battley.

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Keywords: Chatham Island, Chatham Island snipe, *Coenocorypha pusilla*, dispersal record, flying ability, Scolopacidae, snipe