

SHORT NOTE

Predation on non-breeding wrybills in the Firth of Thames

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Evidence of the impacts of introduced mammals on breeding shorebirds in New Zealand is accumulating (e.g., Dowding & Murphy 2001; Sanders & Maloney 2002). Here we describe an instance of predation by mammals on wrybills (*Anarhynchus frontalis*) on one of their main non-breeding grounds (Sagar *et al.* 1999), the Firth of Thames.

On 9 March 2004 we visited a sandbank at the mouth of the Waihou River (37°09' S, 175°32' E), adjacent to Thames in the south-eastern corner of the Firth of Thames. Surrounded on the landward side by mangroves (*Avicennia marina*) with patches of *Spartina anglica*, the sandbank is a breeding site for white-fronted and Caspian terns (*Sterna striata* and *S. caspia*), variable oystercatcher (*Haematopus unicolor*), New Zealand dotterel (*Charadrius obscurus*) and, sometimes, black-billed gull (*Larus bulleri*). It is also an important high tide roost for non-breeding shorebirds, particularly wrybill (550-660 in February-March 2004), New Zealand pied oystercatcher (*H. finschi*; 6,700 on 2 February 2004), red knot (*Calidris canutus*; 1,950 on 9 March 2004) and bar-tailed godwit (*Limosa lapponica*; 252 on 9 March 2004). During a search of the sandbank for dead shorebirds, we found the remains of several wrybills (a nationally vulnerable species; Hitchmough 2002), white-fronted terns (a species in gradual decline; Hitchmough 2002) and a variable oystercatcher, all apparently killed by a predator.

Remains were grouped in four caches in an area of low scrubby vegetation (mainly *Atriplex prostrata*) on the landward side of the sandbank. Three caches were close together (4 m and 3 m either side of the central one) while the fourth was 10 m away. Although the remains were desiccated and therefore difficult to measure, wing length and moult characteristics enabled the number of individual birds to be determined, as follows:

Cache 1: White-fronted tern (A), almost fledged young, both wings and scapular tracts present.

Cache 2: White-fronted tern (B), almost fledged young, both wings present; white-fronted tern (C), partly grown young, one wing present; single tern leg; wrybill (A), both wings present, primary moult 0¹⁰; wrybill (B), left outer wing present, primary moult 5⁵4¹2⁰3, outer primaries worn and brown; three wrybill legs.

Cache 3: Wrybill (C), both wings present, left - 124 mm, primary moult 0¹⁰, right - 122 mm, primary moult 0⁸; wrybill (D), both wings present, left - c.116 mm, primary moult 5³3⁰1, right - primary moult 5⁷3⁰1, outer primaries very worn; wrybill (E), both wings present, left - c.113 mm, primary moult 5⁶2⁰2, right - primary moult 5³3⁰2, outer primaries very worn; three wrybill legs.

Cache 4: Wrybill (F), both wings present, left - primary moult 0⁶, right - 119 mm, primary moult 0⁶; variable oystercatcher, numerous growing feathers (including c. stage 3 primaries).

No torsos or heads were present. The wings were either broken or snapped through the humerus, separated at the humerus-radius/ulna joint, or were lacking the inner wing and had been 'snipped off' through the outer wing.

The four sets of remains were identified as representing six wrybill, three white-fronted tern chicks approaching fledging, and one variable oystercatcher chick. While none of the remains seemed fresh, we could date some of the predation based on knowledge of the local breeding birds. On 1 February 2004, two variable oystercatcher chicks were present, whereas only one fledged juvenile was present on 15 March. Three white-fronted tern chicks were also present on 1 February 2004. So it is likely that the predation occurred during February and/or early March 2004.

A mammalian scat and pellet were found near cache 1, and a scat by cache 3. The scat from cache 1 (55 mm long x 25 mm wide) contained the remains of six black field crickets (*Teleogryllus commodus*), and grassy vegetation. The scat from cache 3 (59 mm x 20 mm) was composed almost entirely of small blackish-grey downy feathers, with additionally at least 20 small contour feathers in pin and two small bone fragments; these were probably remains of the oystercatcher chick. The pellet was undoubtedly from a cat (*Felis catus*; E. Murphy, J. Dowding pers. comm.), and contained mostly cat fur, but also a single hedgehog (*Erinaceus europaeus*) quill, and some passerine claws and small feathers.

Wrybills reach the Firth of Thames from their breeding grounds from the last week of December onwards (Davies 1997), and the moult scores of the carcasses found are consistent with them having been killed at a similar time to the terns and the oystercatcher. Three of the wrybills were about

half-way through their primary moult, a stage reached, on average, in mid-February (Davies 1997). The outer primaries of these birds were considerably more worn than those of the birds that had not started wing moult. Such feather wear is more likely in second-year birds than juveniles or adults (as the feathers are retained for longer before being moulted), and the indications are that second-year birds start moult earlier than adults (Davies 1997). The non-moulting birds were, therefore, not necessarily killed before the moulting birds, and all six wrybills may have been killed over a similar period, despite their differing moult scores. On 15 March, blackbird (*Turdus merula*) feathers were found at the vegetation edge on the sandbank, but no further remains were found when the site was searched again on 16 April 2004.

The bird remains, and mammalian scats and pellet, are consistent with cat predation or scavenging. The birds' bodies and heads had been removed, leaving just wings and legs behind, and the remains were left in the open. Some wing bones were cracked through, while other wings were cut off at the bend of the outer wing. Cats typically eat prey in open areas, usually leaving the wing tips and some feathers of small birds (Veitch 1985). Keedwell *et al.* (2002) found that cats left black-fronted tern (*Sterna albobriata*) remains in the open, detached wings at the mid-humerus, and removed the heads and sometimes upper body. The number of carcasses found at the Waihou River roost indicates that the birds were killed by a predator, rather than scavenged. The predation is probably attributable to a single cat.

Mammalian predators are known to affect birds in coastal habitats e.g., nestling Chatham Island oystercatchers (*Haematopus chathamensis*) killed by cats on Chatham Island beaches (Moore 2003), and breeding and newly released captive-reared New Zealand dotterels killed by stoats (*Mustela erminea*) on North Island beaches (Dowding & Murphy 1996). The naivety of the captive-reared dotterels may have made them especially vulnerable to predation, and it is notable that the remains found at the Waihou River sandbank were those of either extremely approachable (wrybill) or vulnerable (young terns and oystercatcher) individuals. In contrast, no remains were found of the numerous but larger and/or more wary shorebirds that also use the Waihou roost (such as pied oystercatcher and red knot).

The Waihou roost is an important site for non-breeding wrybills, and if the losses to predation that we observed (six birds over a six-week period) were ongoing then the long-term security of the local population could be endangered. Although its frequency and importance is unknown, predation on the non-breeding grounds can be added to the

list of threats to wrybill given by Riegen & Dowding (2003).

When the Waihou River mouth sandbank was first visited by ornithologists in the mid-1990s, it was surrounded by water and accessible at high tide only by boat (T. Habraken, C.R. Veitch pers. comm.) but now mangroves extend from the mainland to the sandbank. This area floods only during spring tides, and even then is able to be accessed on foot, so introduced mammals can now easily reach the sandbank much of the time. The 'security' of other roosts may also change over time, and should be considered in management of the species that occur there. We found the Waihou carcasses by chance, but regular monitoring at roosts used by non-breeding shorebirds could help identify the impacts of mammalian predation on the birds using these sites.

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