

SHORT NOTE

Predation of Northern New Zealand Dotterels (*Charadrius obscurus aquilonius*) by stoats

Survival of the New Zealand Dotterel (*Charadrius obscurus*) is threatened by a number of factors. The most important appear to be destruction and degradation of breeding habitat (Cumming 1991), disturbance during breeding caused by human recreational activities on beaches (Lord 1996) and predation (Marchant & Higgins 1993).

Little is known about the impact of predators, native or introduced, on the species. The decline of the Southern New Zealand Dotterel (*C. o. obscurus*) (Dowding 1994) on Stewart Island has probably been caused largely by feral cats (*Felis catus*) and possibly by rats (*Rattus* spp.) (Dowding & Murphy 1993). Known and potential predators of Northern New Zealand Dotterels (*C. o. aquilonius*) were listed by Marchant & Higgins (1993) but the impact of any of these predators on survival or productivity of dotterel populations is unknown. It is usually difficult to prove a link between any predation event and a particular predator species, especially where the suspected predator is nocturnal and/or secretive. We report here observations which demonstrate that stoats (*Mustela erminea*) are predators of eggs, chicks and adult New Zealand Dotterels.

Between October 1994 and February 1995, Department of Conservation staff monitored New Zealand Dotterels breeding at three sites in the eastern Bay of Plenty (Mark Dobbins, unpubl., Opotiki Field Centre). In early October, seven pairs were present at Waiaua Spit but by late October only two pairs and a single bird remained. On 17 October 1994, Mark Dobbins found a burrow in an isolated patch of gorse (*Ulex europaeus*) on the spit by following tracks from a nearby dotterel nest. On this and later occasions, marks in the sand showed clearly that eggs had been rolled and bodies of birds had been dragged to the burrow from various parts of the spit. The small size of the entrance (about 30 mm across) suggested that it was occupied by a rodent or mustelid. When excavated, the burrow was found to contain the remains of New Zealand Dotterels. On 28 October, Shane Morris and David Rush found a similar hole about 3 m from the first burrow. As they examined it, an adult stoat ran from the entrance; three young stoats and further New Zealand Dotterel remains were found when the den was excavated.

We examined the contents of both dens. The first contained the remains of at least six adult New Zealand Dotterels (four left wings, six right wings, three feet and a head) and one chick (a foot). The only other prey remains were the tail of a mouse (*Mus musculus*) and the leg of a large beetle, which we later identified as a sand scarab (*Pericoptus truncatus*). The second den contained the remains of at least five adult New Zealand Dotterels (one adult beheaded, one joined pair of wings, three left wings, two right wings, three heads) and numerous fragments of New Zealand Dotterel eggshell. There were no other prey remains.

The proximity of the dens, the similar size of the entrances and the similarity of prey remains suggest strongly that the two dens were used by the same stoat. Stoats

are solitary and females, who rear the young alone (King 1989), normally have exclusive ranges, which are typically 50-100 ha in New Zealand (Murphy & Dowding 1994, 1995). It therefore seems likely that one female stoat killed at least eleven adult New Zealand Dotterels (and an unknown number of eggs and chicks) within two months. Many of the stoat tracks and drag-marks found in the sand began close to nests (Mark Dobbins, pers. comm.), suggesting that some adults were killed either on or near the nest.

On 7 February 1995, eight fledged juvenile New Zealand Dotterels were released at Omaha Spit, North Auckland. Five of these had been captive-reared at Otorohanga Zoo and three at Auckland Zoo. Within three days of the release six of the eight were missing; when released, the birds were not strong fliers and it seems unlikely that they were able to disperse any distance so rapidly. On 9 February, the remains of at least two of them (two left wings, two right wings and the metal band from one bird) were found about 30 m from the release point, surrounded by fresh stoat tracks. None of the six was seen again, despite numerous searches of adjacent stretches of coastline during the following year.

Because of the relatively small area of the spit and adjacent scrub at Omaha, it seems likely that one stoat was responsible for killing at least two (and probably six) fledged juvenile New Zealand Dotterels in only three days. Even though these birds were captive-reared (and may have been more naive towards predators than wild-bred juveniles), their disappearance was rapid. Only one of the eight birds released at Omaha was known to be alive one year after release. These results have obvious implications for a number of programmes involving captive-rearing of threatened or endangered bird species in New Zealand.

Stoats which learn to kill adult New Zealand Dotterels can have a dramatic local impact on the species, reducing or extirpating whole breeding groups. Killing is independent of hunger and stoats will continue to kill suitable prey and store them (King 1990). No predation by stoats was detected at the two other sites monitored in the eastern Bay of Plenty (Waiotahi Spit and Waioeka River, which had three and five pairs of dotterels respectively). However, the birds killed at Waiaua Spit represented approximately 1% of the breeding adults in the northern subspecies (Dowding, unpublished data). Whether such predation is sufficiently common and widespread to threaten the survival of the species is unknown, but stoats are common in beach and dune habitat (King 1990) and could therefore be a significant and under-rated predator of New Zealand Dotterels. Stoats are known to take eggs from nests of Banded Dotterels (*C. bicinctus*) (Fitzgerald 1964) and Red-billed Gulls (*Larus novaehollandiae*) (Morris 1976). They probably affect other ground-nesting coastal birds (such as terns and oystercatchers) in New Zealand.

Two further points are worth noting. First, even when stoats have been identified as a problem locally, they may be difficult to control effectively - attempts to trap the stoats at both Waiaua Spit and Omaha Spit were unsuccessful. Second, the number of adult dotterels at Waiaua Spit had increased to at least eight by early January 1995 (Mark Dobbins, unpublished data), presumably as unpaired birds or pairs without territories occupied the vacant areas of the spit. Without the close monitoring that occurred, the losses at Waiaua would probably have passed undetected.

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LITERATURE CITED

- CUMMING, A.B. 1991. The New Zealand Dotterel (Tuturiwhatu): Problems and management. Unpublished MSc Thesis, University of Auckland, Auckland.
- DOWDING, J.E. 1994. Morphometrics and ecology of the New Zealand Dotterel (*Charadrius obscurus*), with a description of a new subspecies. *Notornis* 41: 221-233.
- DOWDING, J.E.; MURPHY, E.C. 1993. Decline of the Stewart Island population of the New Zealand Dotterel. *Notornis* 40: 1-13.
- FITZGERALD, B.M. 1964. Ecology of mustelids in New Zealand. Unpublished MSc Thesis, University of Canterbury, Christchurch.
- KING, C. 1989. *The Natural History of Weasels & Stoats*. Christopher Helm, Bromley.
- KING, C.M. 1990. Stoat. Pp. 288-312 *in* King, C.M. (ed.) *The Handbook of New Zealand Mammals*. Oxford University Press, Auckland.
- LORD, A.E. 1996. Responses of northern New Zealand Dotterels (*Charadrius obscurus aquilonius*) to human disturbance. Unpublished MSc Thesis, University of Waikato, Hamilton, New Zealand.
- MARCHANT, S.; HIGGINS, P.J. (Co-ordinators). 1993. *Handbook of Australian, New Zealand & Antarctic Birds*, Vol. 2. Oxford University Press, Melbourne.
- MORRIS, R.B. 1976. Stoat predation at a Red-billed Gull colony, Kaikoura. *Notornis* 23: 354.
- MURPHY, E.C.; DOWDING, J.E. 1994. Range and diet of stoats (*Mustela erminea*) in a New Zealand beech forest. *N. Z. J. Ecol.* 18: 11-18.
- MURPHY, E.C.; DOWDING, J.E. 1995. Ecology of the stoat in *Nothofagus* forest: home range, habitat use and diet at different stages of the beech mast cycle. *N. Z. J. Ecol.* 19: 97-109.

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