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SHORT NOTE

Weka (*Gallirallus australis*) depredation of sooty shearwater/titi (*Puffinus griseus*) chicks

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The weka (*Gallirallus australis*) is a large flightless rail, endemic to New Zealand. Weka are opportunistic and omnivorous foragers, that feed mostly on invertebrates and fruit, but which are known to prey on eggs and chicks of ground-nesting birds such as petrels and penguins (Brothers 1984; St Clair & St Clair 1992; Higgins and Marchant 1993). Although the Stewart I/Rakiura subspecies (*G. a. scotti*) is now almost extinct on mainland Stewart I, weka are still very common on several adjacent islands (pers. obs.). Weka were introduced to the southern Titi Is, southwest of Stewart I/Rakiura, apparently for food, in the early 20th century (Miskelly 1987). It was on these islands — Taukihepa (Big South Cape I); Rerewhakauopoko (Solomon I); Mokonui (Big Moggy I) — that predation by weka on sooty shearwater/titi (*Puffinus griseus*) chicks was observed. The weka were observed during the course of daily 3-4 h visits to 6 field sites from early Jan to mid-Feb in 2004 and 2005.

The first observation of weka predation on shearwater chicks was on southern Taukihepa on 17 Jan 2004. On 3 occasions an adult weka with 2 chicks was seen grubbing around burrow entrances, then entering rapidly and pulling out 2-3-day-old chicks. The adult weka killed the chicks by striking the back of the head with its beak. The weka ate just the head and discarded the body. Another 4 shearwater chicks with the same distinctive injuries to the head were found in the area.

After this initial observation, 37 chicks with head wounds suggesting attacks by weka were found at various locations around Taukihepa over

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the next 19 days from mid-Jan to early Feb 2004,. Many of these chicks were found during the day, and were still warm. Intact dead chicks ranged in size from 66 to 283 g. Seven chicks were found with at least 1 eye missing and the brain cavity cleaned out; 16 others had only head injuries (normally to the back of the head), but with no skin punctures. The preferred method for killing petrel chicks was by repeated blows to the back of the head, which has been observed for weka elsewhere (St Clair & St Clair 1992). Ten other chicks had had the brain removed through the back of the head. Four others had the head missing altogether.

On Rerewhakuopoko, on 28 Jan 2004, a weka was seen to remove a sooty shearwater chick from a burrow next to a mutton-birders' hut (S. McKechnie pers. comm.). The weka repeatedly "speared the chick in the head". When the 148 g chick was retrieved, it had wounds only to the head. A dead sooty shearwater chick (280 g) with puncture wounds to the head had been found the previous day. Five other sooty shearwater chicks were found, either decapitated or with the head stove in, over the next 12 days.

A juvenile weka was seen killing a sooty shearwater chick on Mokonui on 16 Mar 2005. At 1515 h, I was watching a weka foraging in tupare (*Olearia colensoi*) forest when it suddenly entered a burrow. The weka's back was still visible as it grabbed a sooty shearwater chick by the mantle and, obviously struggling, dragged the chick to the burrow entrance. The weka repeated this procedure 6-8 times, because the chick shuffled back down the burrow. After the last attempt, the weka began to strike the chick's head with its beak, raising itself up to full stretch on its toes and then swiftly bringing the point of its beak down on the back of the chick's head. After every 3-4 strikes, the weka pulled at the chick again, working it towards the burrow entrance.

The sequence of pulling and striking was repeated *c*. 6 times, then the weka grabbed the chick by the tail and pulled it further out of the burrow. The weka struck the chick *c*. 30 more blows on the back of its head, by which time it was not moving very much. The weka then pulled the chick under some punui (*Stilbocarpa lyalli*) about 10 m away, stopping regularly to strike the chick's head in the same characteristic manner as before. After another 2-3 min of this 'plunge-hitting', the weka rolled the chick over, climbed on on to its back, and began pulling at the chick's head to feed. When it had finished feeding, the weka walked away, inspecting burrows as it left. The whole episode lasted *c*. 15 min.

The shearwater chick was retrieved, examined, and weighed (420 g). Its left eye and brain had been removed, and the back of its head was spongy where the skull had been stove in. The weka hit the chick's head *c*. 50 times.

On Taukihepa, from 24 Jan to 13 Feb 2005, a further 30 sooty shearwater chicks, ranging in mass from 91 to 310 g, were found dead. Four chicks were seen being killed or carried by weka. Sixteen of the chicks had their head stove in, 4 had only an eye missing, 6 had an eye and the brain missing, and 4 had been decapitated.

Observations (n = 9) of ship rats (*Rattus rattus*) foraging at carcases of freshly dead sooty shearwater chicks (relocated to a site under mesh to exclude weka), showed that rats usually ate leg and chest muscle and avoided eating the head and viscera. One or more ship rats would quickly find a dead chick placed on the ground shortly before dusk (~2200 h).

In early Jan 2005, before hatching commenced in the colony, 5 fresh sooty shearwater eggs were found, each with a portion of the shell removed and the contents — except for the embryo —removed. It is possible that the damage was caused by weka either taking viable eggs or scavenging abandoned eggs, because ship rats appear to ignore abandoned sooty shearwater eggs on Taukihepa (Brothers 1984; pers. obs.), but ship rats elsewhere take abandoned sooty shearwater eggs (G. Taylor, pers. comm.).

Very similar damage caused by weka was noted on eggs of Fiordland crested penguins (*Eudyptes pachyrhynchus*) on the Open Bay Islands, Westland, where 19% of eggs were stolen by weka (St Clair & St Clair 1992). Weka were also seen to break eggs next to sleeping adults. Weka were observed to eat abandoned sooty shearwater eggs on Rerewhakauopoko (Wilson 1959), and can steal chicken and duck eggs by sticking their beak into them and running off (Lindsay *et al*. 1959). Eggs of southern Buller's albatross (*Diomedea bulleri bulleri*) on the Solander Is were stolen by weka during the change-over between adults (Taylor 2000).

Weka leave distinctive sign of their predation on chicks, killing them by repeated blows to the head, and then eating only the brain. Weka on Big Solander Island in 1996 were, however, observed pulling sooty shearwater chicks out of burrows and eating their viscera as well as the brain (G. Taylor pers. comm.). In contrast, ship rats and cats usually eat the muscled areas on birds first, and the head is usually the last portion consumed. Weka can kill Fiordland crested penguin chicks weighing up to 620 g (St Clair & St Clair 1992), and may be able to kill sooty shearwater chicks of similar weight.

When populations of sooty shearwaters decline below a few thousand individuals, colonies can become very vulnerable to extinction as a result of depredation by a few individual predators (Brothers 1984; Lyver *et al*. 2000; Jones 2002). Populations of smaller petrels with restricted numbers or nesting distribution are more vulnerable to extirpation or severe declines as a result of weka predation (Falla

1948; Blackburn 1965). This has implications for species such as mottled petrels (*Pterodroma inexpectata*) which nest in a small area of forest on Taukihepa, or Westland petrels (*Procellaria westlandica*) in Westland (Hawke & Holdaway 2005).

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LITERATURE CITED

Blackburn, A. 1965. Muttonbird Islands diary. *Notornis 12*: 191-207.

Brothers, N. P. 1984. Breeding, distribution and status of burrow-nesting seabirds at Macquarie Island. *Australian wildlife research 11*: 113-131.

Falla, R. A. 1948. Birds of the Solanders. *New Zealand bird notes 3*: 52-55.

Hawke, D. J.; Holdaway, R. N. 2005. Avian assimilation and dispersal of carbon and nitrogen brought ashore by breeding Westland petrels (*Procellaria westlandica*): a stable isotope study. *Journal of zoology, London 266*: 419-426.

Jones, C. 2002. A model for the conservation management of a 'secondary' prey: sooty shearwater (*Puffinus griseus*) colonies on mainland New Zealand as a case study. *Biological conservation 108*: 1-12.

Lyver, P, O'B.; Moller, H.; Robertson, C. J. R. 2000. Predation at sooty shearwater *Puffinus griseus* colonies on the New Zealand mainland: is there safety in numbers? *Pacific conservation biology 5*: 347-357.

Marchant, S.; Higgins, P. J. (*ed*.) 1993. *Handbook of Australian, New Zealand and Antarctic Birds. Vol. 2. Raptors to Lapwings*. Melbourne, Oxford University Press.

Miskelly, C. M. 1987. The identity of the Hakawai. *Notornis 34*: 95-116.

St. Clair, C. C.; St. Clair, R. C. 1992. Weka predation on eggs and chicks of Fiordland crested penguins. *Notornis 39*: 60-63.

Taylor G.A. 2000. Action plan for seabird conservation in New Zealand, Part A: Threatened seabirds. *Threatened species occasional publication no. 16*, Wellington, Department of Conservation.

Wilson, R. A. 1959. Bird islands of New Zealand. Christchurch, Whitcombe & Tombs.

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