Notornis, 2012, Vol. 59: 176-179
0029-4470

SHORT NOTE

First breeding report of black-winged petrel (*Pterodroma nigripennis*) on Burgess Island, Mokohinau Group, Hauraki Gulf

STEFANIE M.H. ISMAR
GEOMAR – Helmholtz Centre for Ocean Research, Experimental Ecology, Düsternbrooker Weg 20, 24105 Kiel, Germany, and School of Biological Sciences, University of Auckland, PB 92019, Auckland 1142, New Zealand

GRAEME TAYLOR
Department of Conservation, PO Box 10-420, Wellington, New Zealand

CHRIS P. GASKIN
400 Leigh Road, RD5, Whangateau, Warkworth 0985, New Zealand

MATT J. RAYNER
School of Biological Sciences, University of Auckland, PB 92019, Auckland 1142, New Zealand

The black-winged petrel (*Pterodroma nigripennis* (Rothschild 1893)) is a New Zealand indigenous small gadfly petrel with a historically expanding breeding range (Jenkins & Cheshire 1982; Tennyson 1991; Imber 1994; Taylor 2000), which breeds mainly on islands in the south-west and central South Pacific Ocean (Jenkins & Cheshire 1982; Marchant & Higgins 1990; Thibault & Bretagnolle 2007). Recently, black-winged petrels were discovered breeding on Round I in the Indian Ocean (Brooke 2004). The Kermadec Is form the stronghold of the species (Tennyson & Taylor 1990 a,b; Brooke 2004; Gaskin 2011). Other, much smaller, New Zealand breeding populations have been reported from the Three Kings Is (Turbott 1951; McCallum *et al.* 1985; Powlesland 1989), and Chatham Is (Merton 1984; Marchant& Higgins 1990; Tennyson 1991; Imber 1994; Nilsson *et al.* 1994), as well as on Motuopao (Anderson 1982; Pierce & Parrish 1993), Matapia (Anderson 1986), Motukokako (Cameron & Taylor 1991), and on East and Portland Is (Eagle 1980). Earlier reports of prospecting black-winged petrels seen on the Simmonds Is (M. Bellingham, *pers. comm*.), Poor Knights Is and Cuvier I (Jenkins & Cheshire 1982), indicated that colonisation of the wider Hauraki Gulf region by this species would soon occur; however, recent visits to Cuvier and the Poor Knights Is (authors, *unpubl. data*) found no evidence that breeding populations had established.

Received 25 Jun 2012; accepted 4 Sep 2012
Correspondence: *sismar@geomar.de*

Table 1. Measurements (means ± standard deviation) of black-winged petrels (*Pterodroma nigripennis*) recorded on Burgess I, Mokohinau Is, Hauraki Gulf in Jan 2011.

	Weight (g)	Culmen	Bill width (mm)	Depth	Tarsus (mm)	Wing (mm)	Tail (mm)
Sexes combined (n = 17)	186 ± 26	24.5 ± 1.3	9.5 ± 0.8	11.3 ± 0.7	29.5 ± 1.5	227 ± 5	106 ± 4
Females (n = 10)	190 ± 27	24.5 ± 1.4	9.6 ± 0.5	11.1 ± 0.6	29.2 ± 1.6	228 ± 5	106 ± 4
Males (n = 7)	180 ± 26	24.6 ± 1.2	9.5 ± 1.1	11.4 ± 0.9	30.1 ± 1.3	226 ± 4	107 ± 4
T	0.795	-0.297	0.265	-0.780	-1.202	0.780	-0.495
P	0.440	0.771	0.795	0.448	0.248	0.448	0.628

Here we present the 1st record of black-winged petrel (BWP) breeding on Burgess I (Pokohinu), Mokohinau Is, Hauraki Gulf (Fig. 1).

The Mokohinau Is were formed from rhyolite of volcanic origin and are part of the Coromandel volcanic zone (Browne & Greig 1980). The islands are situated about 110 km northeast of Auckland and 25 km northwest of Great Barrier I (Fig. 1, top insert). With an area of about 56 ha, Burgess I (35° 54′ S, 175° 07′ E) is the 2nd largest of the 4 major islands in this group, which also encompasses Fanal (73 ha), Trig (16 ha), Hokoromea (Maori Bay) (11 ha), and 17 smaller islets. Burgess I is characterised by steep cliffs, which in places rise to heights over 100 m; the vegetation of the island had been modified by stock and fire since a lighthouse was errected in 1883. Thirteen islands of the Mokohinau Group, including all 4 larger islands, were infested with kiore (*Rattus exulans*) and Burgess I was highly modified by a prolonged period of farming. It, and its neighbouring island (Maori Bay) also had a population of feral goats (*Capra aegagrus*) before these were removed by the Wildlife Service in 1973 (Whitaker 1974). The Department of Conservation eradicated kiore from Burgess I and the Knights Group of the Mokohinau Is in 1990 (McFadden & Greene 1994). Since then, Burgess I has been free of introduced mammals, allowing the island to recover and improve as wildlife habitat. Burgess I is currently designated an open public reserve as a result of its maritime history, strategic military location and the Maritime New Zealand managed lighthouse. In contrast, other islands of the group, some as close as 50 m from Burgess I, are designated Nature Reserves and qualify for the highest conservation protection. To our knowledge, BWP have historically not been reported from Burgess I (Sandager 1889; Buddle 1947; Whitaker 1974; McCallum 1980), any other islands of the Mokohinau Group, or the Hauraki Gulf area.

On Burgess I (Fig. 1), BWP were 1st sighted in aerial display at dusk over the Main Valley, the Met Station and the Northern Headland in Oct 2005. On 17 Jan 2006, a bird was found on the ground under *Muehlenbeckia* near the Met Station at daybreak. In Dec 2009, BWP were frequently seen flying over the northern part of the island at dusk and night time. Recordings of seabird calls made at the Met Station and on the Northern Headland in Dec 2009 included BWP ground calls. During a seabird monitoring visit to Burgess I (25-31 Jan 2011), 9 active burrows were found, 7 of which were located in a grass/sedge/*Muehlenbeckia* covered area close to the Met Station. Two of these nests were on the north-west slope of the Northern Headland, in an area of *Muehlenbeckia*, harakeke (*Phormium tenax*) and ngaio (*Myoporum laetum*) vegetation. Eight burrows contained an incubating bird. Seventeen BWP were captured by hand, 14 near the Met Station and 3 on the Northern Headland. Eight of these birds were extracted from burrows, the others caught on the ground in the vicinity of burrows, and whenever possible, the breeding stage was noted.

Among the birds captured we found both members of at least 2 pairs. Amongst the BWP captured on the ground was 1 pre-breeder, with a thick, downy brood patch (close to the Met Station, 25 Jan 2011). Three eggs were measured, while incubating birds were handled, on 27 Jan 2011 (egg dimensions : 48.7 x 36.4 mm, fertile 30% term; 48.3 x 36.6 mm, infertile, large air cell; 54.8 x 36.7 mm, fertile 50% term), and 1 on 29 Jan 2011 (52.2 x 37.4 mm, fertile 30% term). All birds were marked with Department of Conservation metal bands upon capture, weighed to the closest 5 g using a 600 g Pesola scale, and bill and tarsus measurements were taken to the closest 0.1 mm using digital calipers. Wing chord and tail were measured to the closest 1 mm (Table 1). A blood sample of 10 µl was taken from the metatarsal vein in adherence to New Zealand Department of Conservation standard operating procedure, and preserved in lysis buffer (Seutin *et al*. 1991) until further analysis. All birds were released where captured following handling. Sex was subsequently genetically determined as in Ismar *et al*. (2010) for PCR set-up, and as in Daniel *et al*. (2007) for temperature cycling. Morphometrics were analysed sex-specifically, and all statistical

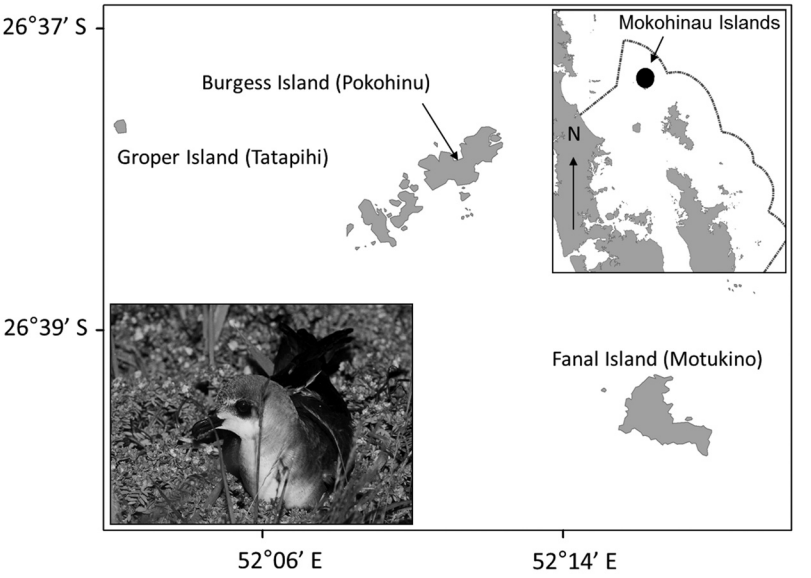

Fig. 1. Location of previously unreported breeding site of black-winged petrel (*Pterodroma nigripennis*) on Burgess I, Mokohinau Is; top insert: geographic location Mokohinau Is in the, Hauraki Gulf of the North I; bottom insert: black-winged petrel on Burgess I (photo credit: Abe Borker, Jan 2012).

tests were perfomed in ΣPlot 11.0 with a significance threshold of $\alpha = 0.05$.

Our morphometric data (Table 1) showed no indication of sexual dimorphism in this population and are consistent with those of the species elsewhere (Marchant & Higgins 1990; Ismar *et al.* 2010). However, a genetic study is required to unravel the origin of the Mokohinau BWP population.

Subsequent observations during research on Burgess I from Dec 2011 - Feb 2012 confirmed the presence of birds at burrows during the likely pre-laying phase and incubation period of this species (Hutton & Priddell 2002). No new burrows were found during the 2011/2012 season. The discovery outside a burrow of an egg in the corpse of a BWP that had been killed by an Australasian harrier (*Circus approximans*) and the observation of a bird incubating an egg in early Feb 2012 further confirm the interannual breeding presence of the species at this location.

The discovery of BWP breeding on Burgess I highlights the rapid changes in seabird diversity on islands following predator and pest eradications, and illustrates the need for regular monitoring within the wider Hauraki Gulf Marine Park region. The addition of this species to the seabird community list of Burgess I confirms the location as a seabird biodiversity hotspot, now supporting 7 breeding species of burrowing Procellariiformes: common diving petrel (*Pelecanoides urinatrix*), fluttering shearwater (*Puffinus gavia*), grey-faced petrel (*Pterodroma macroptera gouldi*), North Island little shearwater (*Puffinus assimilis haurakiensis*), sooty shearwater (*Puffinus griseus*), white-faced storm petrel (*Pelagodroma marina maoriana*), and black-winged petrel. The evidence that BWP now breeds on Burgess I provides further proof that it continues to expand its breeding range (Tennyson 1991; Taylor 2000). Breeding philopatry is generally high in the Procellariiformes (Warham 1996), but for new breeding habitat to be colonised, some individuals must exhibit dispersal. The opportunities to monitor and understand the dynamics of such natural colonisation events are rare (Tennyson 1991; Ortiz-Catedral *et al*. 2009; Ismar *et al*. 2010); continued monitoring of this newly establishing BWP population on Burgess I, in conjunction with phylogeographic studies of the structure of its populations, may help elucidate the dynamics of philopatry and dispersal. Such research may also contribute to further the understanding of intra- and interspecific competition for breeding space, and provide a chance to follow one aspect of the transition of the Mokohinau Is to an increasingly important and diverse wildlife refuge. Furthermore, a review of the conservation status of the Mokohinau I Group would help to maximise protection of this nationally important biodiversity asset, particularly reducing re-infestation risk of rodents to Burgess I.

ACKNOWLEDGEMENTS

We thank the Department of Conservation for Banding and Research Permits, DoC Warkworth Great Barrier Area Office for pre-trip assistance, and Jim Foye and Maritime New Zealand for kindly permitting us to use the Burgess I field accommodation. This work was funded by the Auckland Council through the Coastal Enhancement Fund. We acknowledge the role of Ngati Rehua as Kaitiaki of the Mokohinau Is and thank them for allowing access for the

study of their natural treasures. MJR acknowledges Wendy Rayner for support during this research. K. Baird, D. Bettesworth, A. Borker, A. Gaskin, M.J. Imber, H. Jamieson, I. Southey, and B.M. Stephenson contributed to field work. B. Rathe provided enthusiastic logistic support.

LITERATURE CITED

Anderson, R.A. 1982. Motuopao Island - change of status. Unpublished report to the Commissioner of Crown Lands, Department of Lands & Survey.

Anderson, P. 1986. Brief wildlife survey: Motupia I. off Ninety Mile Beach, Aupouri Peninsula. Unpublished Wildlife Service Report.Whangarei.

Brooke, M. 2004. *Albatrosses and petrels across the world*. Oxford; Oxford University Press.

Browne, G.H.; Greig, D.A. 1980. Geology of Fanal Island (Motukino), Outer Hauraki Gulf, North Auckland. *Tane 26*: 7-19.

Buddle, G.A. 1947. Notes on the birds of Mokohinau. *N.Z. Bird Notes 2*.

Cameron, E.K.; Taylor, G.A. 1991. Flora and fauna of Motukokako (Pierce Island), Cape Brett, Northern New Zealand. *Tane 33*: 121-142.

Daniel, C.; Millar, C.D.; Ismar, S.M.H.; Stephenson, B.; Hauber, M.E. 2007. Evaluating molecular and behavioural sexing methods for the Australasian gannet (*Morusserrator*). *Australian Journal of Zoology 55*: 377–382.

Eagle, M. 1980. Black-winged petrels on Portland Island. *Notornis 27*: 171-175.

Gaskin, C.P. 2011. Seabirds of the Kermadec Region: their natural history and conservation. *Science for Conservation 316*. Department of Conservation, Wellington.

Hutton, I.; Priddel, D. 2002. Breeding biology of the black-winged petrel, *Pterodroma nigripennis*, on Lord Howe Island. *Emu 101*: 361-365.

Imber, M.J. 1994. Seabirds recorded on the Chatham Islands, 1960 to May 1993. *Notornis (Supplement) 41*: 97-108.

Ismar, S.M.H.; Baird, K.; Favell, E.; Hauber, M.E. 2010. Patterns of offspring sex-ratio in a re-establishing population of black-winged petrels (*Pterodroma nigripennis*). *Emu – Austral Ornithology 110*: 104-108.

Marchant, S.; Higgins, P.J. (Co-ordinators). 1990. *Handbook of Australian, New Zealand and Antarctic birds. Vol 1: ratites to ducks, Part A – ratites to petrels.* Melbourne: Oxford University Press.

McCallum, J. 1980. The birds of the northern Mokohinau group. *Tane 26*: 69-78.

McCallum, J.; Potter, M.; Bellingham, M. 1985. Report to the Commissioner of Crown Lands (Auckland) on the birds and lizards of the Three Kings Islands, November 1985. Unpublished report. Department of Internal Affairs, WIL File 34/12/3.

McFadden, I.; Greene, T. 1994. Using brodifacoum to eradicate kiore (*Rattus exulans*) from Burgess Island and the Knights Group of the Mokohinau Islands.Science & Research Series No. 70. Wellington: Department of Conservation.

Merton, D.V. 1984. Confirmation of breeding by black-winged petrel on South-East Island, Chatham Islands. *Notornis 31*: 265-266.

Nilsson, R. J.; West, J.A.; Kennedy, E.S. 1994. The birds of South East Island, Chatham Islands. *Notornis (Supplement) 41*: 109-125.

Ortiz-Catedral, L.; Ismar, S.M.H.; Baird, K.; Brunton, D. H.; Hauber, M.E. 2009. Recolonization of Raoul Island by Kermadec red-crowned parakeets *Cyanoramphus novaezelandiae cyanurus* after eradication of invasive predators, Kermadec Islands archipelago, New Zealand. *Conservation Evidence 6*: 26–30.

Pierce, R.J.; Parrish, G.R. 1993. Birds of Motuopao Island, Northland, New Zealand.*Tane 34*: 59-67.

Powlesland, R. 1989. Report on a visit to Great Island, of the Three Kings, 25 February – 6 March 1989. Science and Research Internal Report No. 72. Wellington: Department of Conservation.

Rothschild, W. 1893. On some new species from Hawaii and New Zealand. *Bulletin of the British Ornithologists' Club 1*: 56-59.

Sandager, F. 1889. Observations on the Mokohinau Islands and the birds which visit them. *Transactions of the New Zealand Institute* 22.

Seutin, G., White, B.N.; Boag, P.T. 1991. Preservation of avian blood and tissue samples for DNA analyses. *Canadian Journal of Zoology* 69: 82–90.

Taylor, G.A. 2000. *Action plan for seabird conservation in New Zealand. Part B. Non-threatened seabirds.* Wellington: Threatened Species Occasional Publication No. 17. Department of Conservation.

Tennyson, A.J.D. 1991. The black-winged petrel on Mangere Island, Chatham Islands. *Notornis* 38: 111-116.

Tennyson, A.; Taylor, G. 1990a. Curtis Island. *OSNZ News* 57: 10.

Tennyson, A.J.D.; Taylor, G.A. 1990b. Behaviour of *Pterodroma* petrels in response to 'war-whoops'. *Notornis* 37: 121-128.

Thibault, J.-C.; Bretagnolle, V. 2007. Atlas des oiseaux marins nicheurs de Polynésie français et du Groupe Pitcairn. Unpublished, Manu Société d'Ornthilogie de Polynésie for the Government of French Polynesia, Papae'ete.

Turbott, E.G. 1951. Notes on the birds of the Three Kings Islands. *Records of the Auckland Institute and Museum* 4: 141-143.

Warham, J. 1996. *The behaviour, population biology and physiology of the petrels*. London: Academic Press.

Whitaker, A.H. 1974. *Report on a visit to the Mokohinau Islands, Hauraki Gulf, 20 November to 4 December 1973.* Unpublished Report, Auckland District Office. Auckland: Department of Internal Affairs.

Keywords breeding range; breeding phenology; colonisation; predator eradication; rat-free island; seabird; island conservation status