

## SHORT NOTE

### Do grey-backed storm petrels (*Garrodia nereis*) breed in Fiordland, New Zealand?

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There is a long history of grey-backed storm petrels (*Garrodia nereis*) being found far from the open sea in Fiordland (e.g. Bell 1961; Cooper 1980; Morrison 1983; Hawke 1989). The region is hundreds of kilometres distant from known New Zealand breeding sites on the Chatham, Antipodes, Auckland and Campbell Islands (Marchant & Higgins 1990; Taylor 2000), and so there has been speculation over where these birds were from (Southey 2013). Here, we report sightings of at least 3 grey-backed storm petrels in Dusky Sound in November 2016, summarise previous sightings from the region, and propose an explanation for the pattern of sightings.

We participated in a boat-based biological survey in Dusky Sound 15-24 November 2016,

which included spot-lighting for petrels from the deck of the boat at night at 5 sites (Miskelly *et al.* submitted ms). We did not see any grey-backed storm petrels on land or during daylight (including when travelling between the entrances of Doubtful, Dusky and Breaksea Sounds), but saw them in flight at night at 2 locations within Dusky Sound.

The first sighting was of at least 2 grey-backed storm petrels in the spot-light beam around Oke Island, Wet Jacket Arm between 2230-2330 h on 19 November 2016, with 2 birds in the beam simultaneously on numerous occasions (1 of the birds is shown in Fig. 1). This site is surrounded by mountains, and is 23 km from the open sea via Breaksea Sound. The second sighting was of a single grey-backed storm petrel in the spot-light beam between the Seal Islands and the Many Islands (south-west of Anchor Island, 4 km from the open sea) between 2210-2300 h on 20 November 2016.

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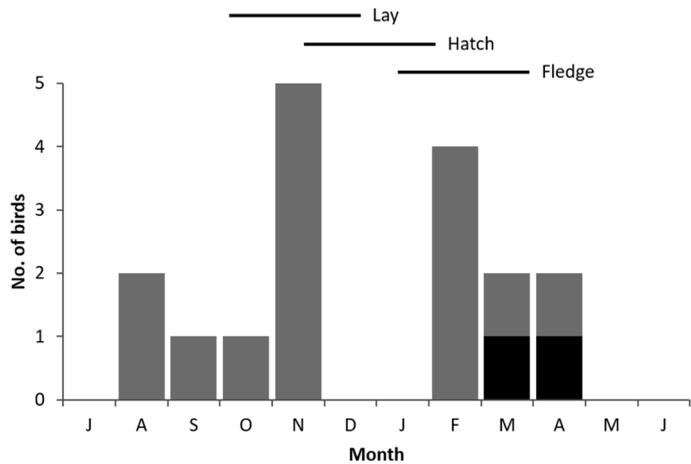


**Fig. 1.** Grey-backed storm petrel in spotlight beam, Wet Jacket Arm, Fiordland, 19 November 2016. Image: Jean-Claude Stahl, Te Papa.

**Table 1.** Grey-backed storm petrel records from Fiordland, and western Southland and Otago.

Year	Date	Details
1889	-	a specimen from Preservation Inlet in Canterbury Museum (AV20778; Paul Scofield, <i>pers. comm.</i> to CMM)
1961	17 Feb	1 found at night (released alive) at Milford Hotel, Milford Sound (Bell 1961)
1978	June	3 or 4 found dead at 2480 m on Mount Aspiring (Lloyd Esler <i>in</i> Sibson 1978); a skeleton of 1 of the birds is in the Te Papa collection (OR.021113)
1980	12 Feb	2 birds grounded at Manapouri Motor Inn (Kim Morrison <i>in</i> Sibson 1981)
1980	29 Aug	2 birds at night (released alive) at Deep Cove, Doubtful Sound (Cooper 1980)
1982	5 Nov	1 bird at night (released alive) at Lake Howden Hut, Routeburn Track (Morrison 1983)
1985	24 Mar	1 fledgling with down found on the shore of Lake Te Anau (Te Papa collection OR.026519)
1986	13 Mar	1 attracted to house lights at night at Knobs Flat, Eglinton Valley (Kim Morrison <i>in</i> Gaze 1987)
1986	17 Apr	1 fledgling with down on its head found on the main street of Te Anau, released on Lake Te Anau (Kim Morrison & Alan Wright <i>in</i> Gaze 1987)
1988	2 Nov	1 bird found at night (released alive) at Deep Cove, Doubtful Sound (Hawke 1989)
1992	2 Apr	1 on doorstep at night after bad southerly, at Burwood Bush (32 km south-east of Te Anau) (Ron Van Merlo <i>in</i> O'Donnell & West 1994)
2011	2 Feb	1 bird seen from a boat south of Bauza Island, Doubtful Sound (Neil Robertson eBird record <a href="http://ebird.org/ebird/newzealand/view/checklist/S25745471">http://ebird.org/ebird/newzealand/view/checklist/S25745471</a> , viewed 1 April 2017; Neil Robertson, <i>pers. comm.</i> to CMM 5 April 2017)
2013	18 Sep	1 bird on moored boat at night, Beach Harbour, Breaksea Sound (Hannah Edmonds, <i>pers. comm.</i> to CMM, 24 November 2016)
2015	12 Oct	1 bird found at midday on a boat that had been moored overnight in Precipice Cove, Bradshaw Sound (released alive) (Neil Robertson eBird record <a href="http://ebird.org/ebird/view/checklist/S25386525">http://ebird.org/ebird/view/checklist/S25386525</a> , viewed 1 April 2017)
2016	19 Nov	2 birds in spotlight at night, off Oke Island, Wet Jacket Arm
2016	20 Nov	1 bird in spotlight at night, between Seal and Many Islands, Dusky Sound

**Fig. 2.** Seasonal spread of grey-backed storm petrel records from Fiordland. The X-axis shows months, starting with July. Black = downy fledglings. Ranges of New Zealand lay, hatch and fledge dates derived from Imber (1985), Plant (1989) and Marchant & Higgins (1990).



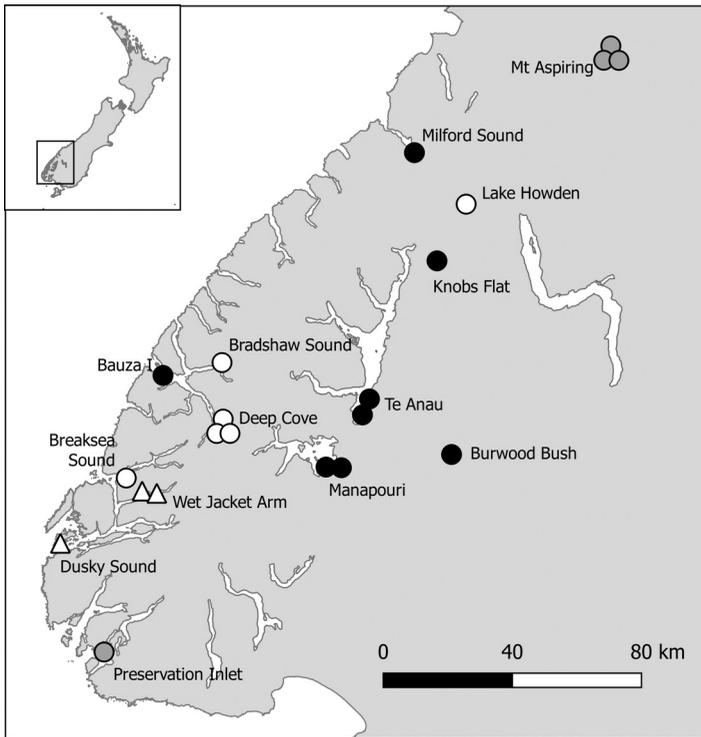
These are apparently the first records of grey-backed storm petrels in Dusky Sound. A list of grey-backed storm petrel records from Fiordland and western Southland or Otago for which details are known is provided in Table 1. Department of Conservation (DOC) staff who accompanied us in Dusky Sound were aware of several other grey-backed storm petrel sightings from Doubtful Sound and over Lakes Te Anau and Manapouri in recent years that had not been written down, and so dates of the sightings are unknown (Andrew Smart, Hannah Edmonds and Pete Young pers. comm. to CMM, 24 November 2016).

The temporal spread of the 14 accurately dated records reveals that 9 birds were seen between August and November, and 8 birds (including 2 confirmed fledglings) between February and April (Fig. 2). Grey-backed storm petrels breeding at the Chatham and Antipodes Islands have a protracted breeding season extending over at least 6 months from the start of laying until the last chicks depart (Imber 1985; Plant 1989; Marchant & Higgins 1990). Laying extends from late September to mid December, hatching (after c.45 days of incubation) from mid November to the end of January, and fledging (after a c.50 day chick-rearing period) from early January to at least late March (Fig. 2). The first pulse of grey-backed storm petrels detected in Fiordland and nearby locations corresponds with the courting and early egg-laying period, while the second pulse aligns with the estimated fledging period for grey-backed storm petrels in New Zealand (Fig. 2).

Adult petrels that have yet to enter the breeding population are mainly present at colonies during

the pre-egg and incubation stages (Warham 1990 pp.252-253). These pre-breeders have less site-attachment than established breeders, and are more likely to be attracted to nearby artificial light sources (e.g. Imber *et al.* 2005). Recently fledged juveniles are attracted to artificial lights at a much higher rate than pre-breeders, with fledglings comprising 68-99% of individuals found per species in a global review reporting on 56 petrel species attracted to artificial lights (Rodríguez *et al.* 2017). We suggest that the temporal spread of Fiordland grey-backed storm petrel records shown in Fig. 2 is the pattern that would be expected if there was a local breeding population, with the August to November pulse likely to be predominantly pre-breeders, and the February to April pulse mainly or entirely locally-reared fledglings. The relatively low number of birds recorded in February to April compared to the expected proportion of fledglings (Rodríguez *et al.* 2017) may reflect small population size and low reproductive success. We would expect occasional large pulses of fledglings if there was a substantial breeding population near an artificial light source in Fiordland.

Spatial and temporal spread of the full dataset of 16 records of at least 21 birds is shown in Fig. 3. The presumed adults (August to November records) were mainly seen in inner fiords in central to southern Fiordland, between Bradshaw Sound and Dusky Sound. The presumed fledglings (February to April) were mainly in the north and east, between Milford and Manapouri. However, this is also where most of the artificial lights in Fiordland are located, and the distribution may be an artefact of how readily fledgling petrels are



**Fig. 3.** Records of grey-backed storm petrels from Fiordland and nearby localities. White triangles = November 2016 sightings; white circles = other August to November records; black circles = February to April records; grey circles = records not able to be assigned to time of year. Records of multiple individuals from the same locality have been offset slightly to emphasise the number of individuals recorded.

drawn to artificial lights (Rodríguez *et al.* 2017).

There are few records of grey-backed storm petrels off the Fiordland coast, despite search effort covering all months apart from October (Jenkins & Cheshire 1982; Jenkins 1988). John Jenkins' dataset of New Zealand seabird sightings during 1973–88 included only 2 grey-backed storm petrels off Fiordland (Fig. 4). However, Jenkins undertook bird observations during a *RV Raphuia* research voyage off Westland 8–18 November 1986, with a total of 144 grey-backed storm petrels recorded (Fig. 4; data from logbooks held by Auckland Museum). This overlapped with when breeding birds would have been incubating, and may have included birds from Fiordland.

The report of 3–4 dead birds found high on Mt Aspiring in June 1978 provides an intriguing hint that grey-backed storm petrels may be nesting above the tree-line in subalpine vegetation in the south-west South Island. Further, the widely spread records shown in Fig. 3 suggests multiple breeding sites scattered over a vast landscape, rather than a single remnant colony.

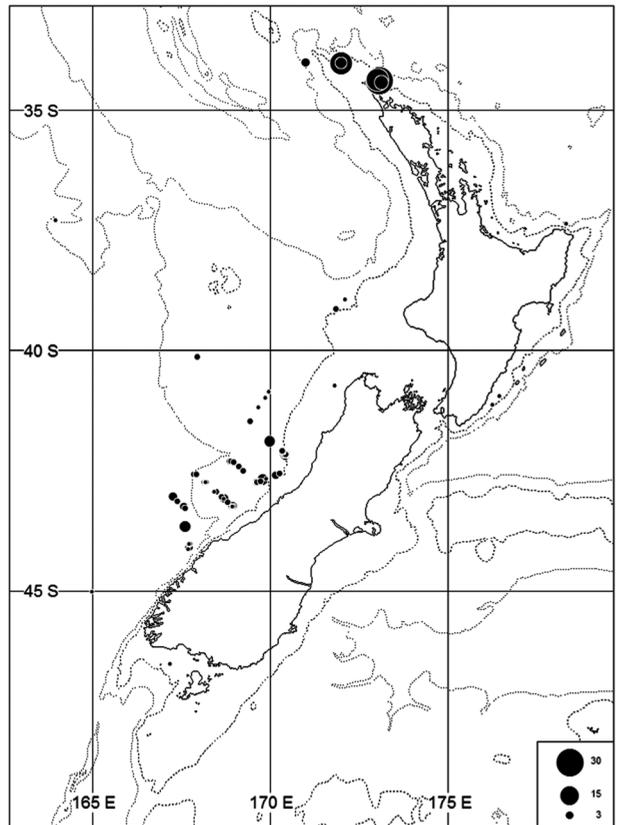
Attempting to locate grey-backed storm petrel breeding colonies within Fiordland would be a daunting challenge. While methodology has recently been developed to catch storm petrels at sea

and track them to breeding sites (Rayner *et al.* 2015), grey-backed storm petrels in Fiordland would be harder to catch and track than New Zealand storm petrels (*Fregatta maoriana*) in the Hauraki Gulf. The Fiordland birds are likely to be feeding well off shore in exposed seas that are further from accessible ports. If any birds were successfully caught and tagged, the mountainous terrain would make tracking any signals a more difficult proposition than following a bird to an isolated island surrounded by open sea. The fact that the grey-backed storm petrel is a common species that is widely distributed around the southern ocean also means that the Fiordland birds are less likely to attract the level of research effort that has been focused on New Zealand storm petrels.

It is perhaps more realistic to hope that some of the grey-backed storm petrels that attempt to breed in Fiordland will benefit from the landscape-scale predator control already in place around Resolution Island/Dusky Sound and further north around Secretary Island (Edge *et al.* 2011; Wildland Consultants & DOC 2016).

There is still much that we can learn from the occasional grey-backed storm petrels that are found near buildings and aboard boats in Fiordland. An important step would be to establish a database of

**Fig. 4.** Grey-backed storm petrel sightings in New Zealand waters recorded by John Jenkins 1973 to 1988. The 144 birds recorded off Westland were during a research survey in November 1986; this was an area otherwise rarely visited by Jenkins, who regularly passed the Fiordland coast en route between southern Australia and Dunedin. The 7 records of 4-30 birds off the Three Kings Islands and North Cape were on 1 January 1980 (50 birds) and 16 November 1985 (58 birds) respectively. Data held by Auckland Museum, and in digital format by Te Papa.



birds seen and handled, and for local bird experts (with DOC approval) to attempt to check as many of the birds as possible for clues as to their age and breeding condition. This includes searching for down, measuring wing length, checking for moult and wear on primary feathers and elsewhere, and checking brood patch condition, as well as checking for soil or seeds adhering to plumage. Feather or blood samples should be taken from live birds to allow genetic and isotopic comparisons with birds from other breeding populations. Any birds that die or that are found dead should be sent to one of the major museums, to ensure specimens are available for research that may shed light on where the birds are breeding.

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preparation of Figure 3. Captain John Jenkins (1928-1989) recorded sightings of seabirds while working as a New Zealand-based merchant mariner. His 1973-88 logbooks are held at Auckland Museum, and were transcribed to digital format by J-CS.

#### LITERATURE CITED

- Bell, B.D. 1961. Grey-backed storm petrel at Milford Sound. *Notornis* 9: 172.
- Cooper, W.J. 1980. Grey-backed storm petrels at Doubtful Sound. *Notornis* 27: 396.
- Edge, K.-A.; Crouchley, D.; McMurtrie, P.; Willans, M.J.; Byrom, A. 2011. Eradicating stoats (*Mustela erminea*) and red deer (*Cervus elaphus*) off islands in Fiordland. Pp 166-171 in: Veitch, C.R.; Clout, M.N.; Towns, D.R. (eds) *Island invasives: eradication and management*. Gland, Switzerland: IUCN.
- Gaze, P.D. 1987. Classified Summarised Notes South Island. *Notornis* 34: 148-166.
- Hawke, D. 1989. Grey-backed storm petrel at Doubtful Sound, Fiordland. *Notornis* 36: 123.
- Imber, M.J. 1985. Grey-backed storm petrel. p. 103 p in Robertson, C.J.R. (ed.) *Complete book of New Zealand birds*. Sydney: Reader's Digest.
- Imber, M.J.; Taylor, G.A.; Tennyson, A.J.D.; Aikman, H.A.; Scofield, R.P.; Ballantyne, J.; Crockett, D.E. 2005. Non-breeding behaviour of Magenta petrels *Pterodroma*

- magentae* at Chatham Island, New Zealand. *Ibis* 147: 758-763.
- Marchant, S.; Higgins, P.J. (eds) 1990. *Handbook of Australian, New Zealand and Antarctic birds*. Vol. 1, part A (Ratites to petrels). Melbourne: Oxford University Press.
- Miskelly, C.M.; Tennyson, A.J.D.; Stahl, J.-C.; Smart, A.F.; Edmonds, H.K.; McMurtrie, P.G. Submitted ms. Breeding petrels of Dusky Sound, Fiordland – survivors from a century of stoat invasions. *Notornis*.
- Morrison, K. 1983. Grey-backed storm petrel on Routeburn Track. *Notornis* 30: 108.
- O'Donnell, C.F.J.; West, J.A. 1994. Classified Summarised Notes, South Island. *Notornis* 41: 167-188.
- Plant, A.R. 1989. Incubation and early chick rearing in the grey-backed storm petrel (*Garrodia nereis*). *Notornis* 36: 141-147.
- Rayner, M.J.; Gaskin, C.P.; Fitzgerald, N.B.; Baird, K.A.; Berg, M.M.; Boyle, D.; Joyce, L.; Landers, T.J.; Loh, G.G.; Maturin, S.; Perriman, L.; Scofield, R.P.; Simm, J.; Southey, I.; Taylor, G.; Tennyson, A.J.D.; Robertson, B.C.; Young, M.; Walle, R.; Ismar, S. 2015. Using miniaturized radiotelemetry to discover the breeding grounds of the endangered New Zealand storm petrel *Fregatta maoriana*. *Ibis* 157: 754-766.
- Rodríguez, A.; Holmes, N.D.; Ryan, P.G.; Wilson, K.-J.; Faulquier, L.; Murillo, Y.; Raine, A.F.; Penniman, J.; Neves, V.; Rodríguez, B.; Negro, J.N.; Chiaradia, A.; Dann, P.; Anderson, T.; Metzger, B.; Shirai, M.; Deppe, L.; Wheeler, J.; Hodum, P.; Gouveia, C.; Carmo, V.; Carreira, G.P.; Delgado-Alburquerque, L.; Guerra-Correa, C.; Couzi, F.-X.; Travers, M.; Le Corre, M. 2017. A global review of seabird mortality caused by land-based artificial lights. *Conservation Biology* DOI: 10.1111/cobi.12900.
- Sibson, R.B. 1978. Classified Summarised Notes. *Notornis* 25: 332-349.
- Sibson, R.B. 1981. Classified Summarised Notes. *Notornis* 28: 57-85.
- Southey, I. 2013. Grey-backed storm petrel. In Miskelly, C.M. (ed.) *New Zealand birds online*. [www.nzbirdsonline.org.nz](http://www.nzbirdsonline.org.nz)
- Taylor, G.A. 2000. Action plan for seabird conservation in New Zealand. Part B: non-threatened seabirds. *Threatened Species occasional publication* 17. Wellington: Department of Conservation.
- Warham, J. 1990. *The petrels; their ecology and breeding systems*. London: Academic Press.
- Wildland Consultants; Department of Conservation 2016. *Tamatea/Dusky Sound conservation and restoration plan*. New Zealand, Department of Conservation. <http://www.doc.govt.nz/Documents/our-work/dusky-sound-restoration-plan.pdf>

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