

SHORT NOTE

Further evidence in support of grey-backed storm petrels (*Garrodia nereis*) breeding in Fiordland

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The grey-backed storm petrel (*Garrodia nereis*) is a small seabird that breeds at many sites around the Southern Ocean, including at the Chatham, Antipodes, Auckland, and Campbell Islands in the New Zealand region (Marchant & Higgins 1990; Taylor 2000; Miskelly *et al.* 2020a). The possibility that grey-backed storm petrels also breed in Fiordland, in the south-west of mainland New Zealand, was raised by Miskelly *et al.* (2017a), who summarised records of at least 21 birds reported between 1889 and 2016, including several recently fledged juveniles unlikely to have travelled far from their nests.

The three grey-backed storm petrels seen in 2016 and reported by Miskelly *et al.* (2017a) were observed during a survey for burrow-nesting seabirds on islands in Dusky Sound and associated waterways. We have since returned to Fiordland to

undertake similar boat-based surveys in Chalky and Preservation Inlets (November 2017), Breaksea and Dusky Sounds (December 2019), and Milford Sound south to Dagg Sound (November 2020) (Miskelly *et al.* 2017b, 2019, 2020b, and accepted ms, and have searched for grey-backed storm petrels during each survey. Land-based spot-lighting was also undertaken by CMM at Lake Secretary on Secretary Island 18 & 19 February 2020, at the southern end of Coal Island, Preservation Inlet on 23 & 24 February 2020, and near the hut on Anchor Island, Dusky Sound, 10–15 March 2021. Additionally, we report other anecdotal Fiordland sightings since 2017.

The main method used to search for storm petrels was spot-lighting from the flying bridge of the Department of Conservation vessel *Southern Winds*, using a large vessel-mounted search-light as the main light source. Petrels as a group are highly attracted to bright lights, particularly on dark or misty nights, and this method has been used to survey for storm petrels elsewhere in New Zealand (Imber 1975a; Rayner *et al.* 2015; Rodríguez *et al.* 2017). Two hand-held 1,500 lumens spot-lights were

Table 1. Petrels observed and captured during spot-lighting sessions in Fiordland, New Zealand, 2016–2021. Species recorded were: mottled petrel (*Pterodroma inexpectata*), broad-billed prion (*Pachyptila vittata*), Antarctic prion (*P. desolata*), sooty shearwater (*Ardenna grisea*), common diving petrel (*Pelecanoides urinatrix*), and grey-backed storm petrel (*Garradina nereis*). Birds captured are shown in parentheses.

Date	Time (h)	Location	Birds seen (& caught)
15 Nov 2016	2215–2315	Seal Islands, Dusky Sound	c. 30 broad-billed prions, 2 sooty shearwaters
17 Nov 2016	2200–2300	Anchor Island Harbour, Dusky Sound	20+ mottled petrels
19 Nov 2016	2215–2320	Off Oke Island, Wet Jacket Arm	2 grey-backed storm petrels
20 Nov 2016	2210–2300	West of Many Islands, Dusky Sound	30 sooty shearwaters, 15 mottled petrels, 3 broad-billed prions, 1 grey-backed storm petrel
20 Nov 2017	2245–2340	Off Only Island, Long Sound	2 grey-backed storm petrels
21 Nov 2017	2300–2330	Cuttle Cove, Preservation Inlet	40+ mottled petrels
22–23 Nov 2017	2255–0005	Sealers Bay, Chalky Island, Chalky Inlet	10+ mottled petrels, 10+ sooty shearwaters (1), 2 grey-backed storm petrels (1), 2 common diving petrels (2, 1 broad-billed prion (1), 1 Antarctic prion (1)
23 Nov 2017	2255–2330	North Port, Chalky Inlet	No petrels seen
24–25 Nov 2017	2345–0015	Small Craft Harbour Islands, Chalky Inlet	7 mottled petrels, 2 sooty shearwaters (1), 1 grey-backed storm petrel
10 Dec 2019	2300–0000	Beach Harbour, Breaksea Sound	No petrels seen (bright moon conditions)
11 Dec 2019	2300–0000	Stevens Cove, northern Resolution Island	No petrels seen (bright moon conditions)
13 Dec 2019	2300–0000	Luncheon Cove, Anchor Island	1 sooty shearwater (bright moon conditions)
18 Feb 2020	2225–2325	Secretary Lake, Secretary Island	No petrels seen
19 Feb 2020	2245–2345	Secretary Lake, Secretary Island	No petrels seen
23 Feb 2020	2225–2325	Coal Island, Preservation Inlet	2 mottled petrels, 2 sooty shearwaters
24 Feb 2020	2235–2335	Coal Island, Preservation Inlet	2 mottled petrels
11 Nov 2020	2200–2300	Anita Bay, Milford Sound	7 grey-backed storm petrels (2), 3 sooty shearwaters
12 Nov 2020	2215–2315	Catherine Islands, Charles Sound	1 grey-backed storm petrel (1)
13 Nov 2020	2215–2315	Blanket Bay, south-east Secretary Island	3 grey-backed storm petrels, 1 mottled petrel, 1 sooty shearwater
14 Nov 2020	2215–2315	Precipice Cove, Bradshaw Sound	2 grey-backed storm petrels
15 Nov 2020	2215–2315	Head of Dagg Sound, by Narrow Neck	1 grey-backed storm petrel, 1 broad-billed prion
16 Nov 2020	2215–2315	Head of Hall Arm, Doubtful Sound	4 grey-backed storm petrels (1), 1 mottled petrel
10–11 Mar 2021	2330–0030	Anchor Island, Dusky Sound	No petrels seen (calm, clear, no moon)
11–12 Mar 2021	2330–0030	Anchor Island, Dusky Sound	No petrels seen (calm, clear, no moon)
12–13 Mar 2021	2320–0020	Anchor Island, Dusky Sound	No petrels seen (calm, clear, no moon)
13–14 Mar 2021	2310–0010	Anchor Island, Dusky Sound	4 mottled petrels (windy, part cloudy, no moon)
14 Mar 2021	0540–0625	Anchor Island, Dusky Sound	No petrels seen (windy, overcast, no moon)
14–15 Mar 2021	2320–0020	Anchor Island, Dusky Sound	1 sooty shearwater (windy, overcast, no moon)

used to attempt to get birds to land on the deck or nearby sea-surface, where they could then be caught from a rigid-hull inflatable launched from the main vessel. The same hand-held spot-lights were used for land-based spotlighting on Secretary, Coal, and Anchor Islands.

Spot-lighting surveys were mainly undertaken near known or suspected petrel breeding sites in 2016. On subsequent boat-based surveys we sought to moor or anchor at widely-spaced sites, and routinely undertook spot-lighting surveys each night regardless of proximity to known petrel breeding sites (Table 1). Bright moon conditions and clear skies rendered spot-lighting largely futile in December 2019 (see Rayner *et al.* 2015), and we abandoned attempts from two additional sites in Breaksea and Dusky Sounds during that week.

Grey-backed storm-petrels were the most frequently recorded of six petrel species seen during spot-lighting surveys, and were recorded at 11 of 21 sites (Fig. 1, Table 1). The number of storm petrels recorded at each site was a conservative minimum, as we treated any birds seen within 20 minutes of each other as likely to have been the same individual, unless two or more birds were observed simultaneously. The largest number of individuals recorded at one site was seven at Anita Bay, Milford Sound, on 11 November 2020, when five storm petrels were visible at once while two other captured birds were still being held.

Further to the five grey-backed storm petrels captured during spot-lighting sessions (Fig. 2, Table 1), an additional bird was caught shortly before dawn on 17 November 2020, when it flew into the dark wheelhouse of the *Southern Winds* while the vessel was at anchor at the head of Hall Arm, Doubtful Sound (Table 2). The bird was apparently attracted to the light of a laptop screen. All six birds handled had unworn plumage, and four had downy (or mostly downy) brood patches. However, the birds captured off Chalky Island on 22 November 2017 and at Hall Arm on 17 November 2020 both had bare brood patches, indicating that they were incubating eggs or brooding young chicks at the time of capture. Grey-backed storm petrels have a prolonged and asynchronous breeding season in New Zealand, with incubation and chick-rearing extending from September to April (Imber 1985; Plant 1989; Marchant & Higgins 1990). The November spot-lighting sessions occurred during expected incubation and the start of hatching (Miskelly *et al.* 2017a).

Several of the recent records of grey-backed storm petrels in South Westland were a long way from the open sea (Fig. 3), including Routeburn Falls (36 km), Long Sound, off Preservation Inlet (28 km, 32 km via water), the head of Hall Arm, Doubtful Sound (27 km, 40 km via water), and the

Table 2. Grey-backed storm petrel records from Fiordland, New Zealand, 2017–2020.

Date	Location	Source	Detail
17 Aug 2017	Head of Broughton Arm, Breaksea Sound	eBird	1 landed on vessel during previous night
20 Nov 2017	Off Only Island, Long Sound	Table 1	2 seen during spot-lighting
22 Nov 2017	Sealers Bay, Chalky Island, Chalky Inlet	Table 1	2 seen during spot-lighting, 1 (with bare brood patch) caught
24 Nov 2017	Small Craft Harbour Islands, Chalky Inlet	Table 1	1 seen during spot-lighting
21 Dec 2018	Above Routeburn Falls, Routeburn Track	CMM <i>pers. obs.</i>	1 found stoat-killed
28 Jan 2020	Off entrance to Thompson Sound	eBird	1 seen at sea
30 Jan 2020	Off entrance to Nancy Sound	eBird	1 seen at sea
11 Nov 2020	Anita Bay, Milford Sound	Table 1	7 seen during spot-lighting, 2 caught
12 Nov 2020	Catherine Islands, Charles Sound	Table 1	1 caught during spot-lighting
13 Nov 2020	Blanket Bay, south-east Secretary Island	Table 1	3 seen during spot-lighting
14 Nov 2020	Precipice Cove, Bradshaw Sound	Table 1	2 seen during spot-lighting
15 Nov 2020	Blanket Bay, south-east Secretary Island	Pete Young <i>pers. comm.</i>	1 landed on vessel during previous night
15 Nov 2020	Head of Dagg Sound, by Narrow Neck	Table 1	1 seen during spot-lighting
16 Nov 2020	Head of Hall Arm, Doubtful Sound	Table 1	4 seen during spot-lighting, 1 caught
17 Nov 2020	Head of Hall Arm, Doubtful Sound	CMM <i>pers. obs.</i>	1 (with bare brood patch) flew on board before dawn (0535 h)



Figure 1. Grey-backed storm petrel in spot-light beam, Blanket Bay, Secretary Island, 13 November 2020. Photograph: Jean-Claude Stahl.



Figure 2. Two grey-backed storm petrels captured during spot-lighting at Anita Bay, Milford Sound, 11 November 2020. Photograph: Jean-Claude Stahl.

head of Broughton Arm, Breaksea Sound (22 km, 30 km via water).

This summary reveals that grey-backed storm petrels can be readily found throughout the length and breadth of coastal Fiordland if spot-lighting in late spring is used as a targeted survey methodology. Informal conversations with commercial fishers in Fiordland indicate that grey-backed storm petrels are frequently attracted to fishing vessels at night (e.g. Pete Young *pers. comm.* 17 November 2020). We suggest that the species is attempting to breed at multiple sites in the region, probably spread over an area exceeding 200 km north-south and 40 km west-east. Given the extreme vulnerability of storm petrels to introduced predators (Imber 1975b; Taylor 2000), it is likely that grey-backed storm petrels breeding sites in Fiordland are on cliff ledges or other sites inaccessible to rats and stoats. Grey-backed storm petrel nest sites are cryptic

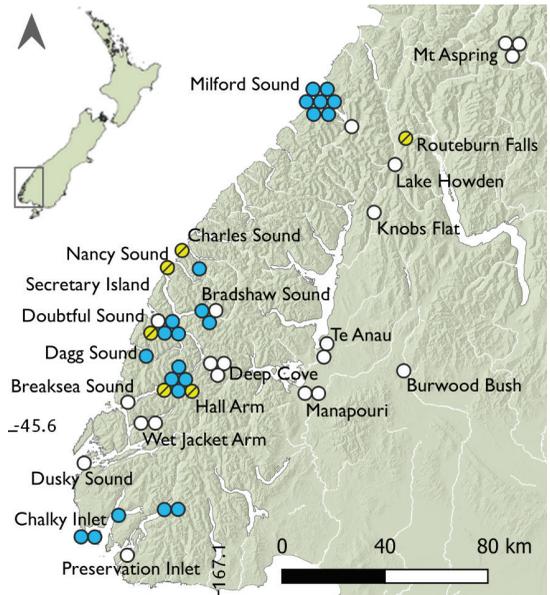


Figure 3. Spatial representation of grey-backed storm petrel records from Fiordland. Each symbol represents a single bird, with symbols offset slightly where multiple birds were recorded from a single location, or from two nearby locations. White circles show 21 individuals recorded from 1889 to 2016 (based on Miskelly *et al.* [2017, Fig. 3]); blue circles show 23 individuals seen or caught during spot-lighting surveys in November 2017 and 2020; yellow circles show six additional individuals recorded during 2017 to 2020 (details in Table 2).

and difficult to locate even at known breeding sites (authors' *pers. obs.*). Locating their nests in the vast, rugged landscape of Fiordland poses considerable challenges. One method that could be used to focus search effort would be to search for storm petrel feathers in the nest linings of rock wrens (*Xenicus gilviventris*), a method previously used to indicate the presence of kākāpō (*Strigops habroptilus*) in Fiordland (Carey 2020, p. 205). In the future, technological advances may lead to suitable tracking transmitters being available to follow birds to their nesting sites.

The 2016 to 2020 Fiordland seabird surveys were funded by Te Papa and the Department of Conservation. We thank the skippers and crew of *Southern Winds* for accommodating our spot-lighting requirements into the wider survey programme, and our shipmates for tolerating the noise of the ship's generator running late into the night. Thanks also to Pete Young for information on grey-backed storm petrels and other petrels in Fiordland, and Jaz Hamilton for producing the map.

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Keywords: breeding, Fiordland, *Garrodia nereis*, grey-backed storm petrel