

Observation of an all-dark *Pseudobulweria* petrel in the Bismarck Sea, with a review and discussion of recent records

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SUMMARY.—The observation of an all-dark *Pseudobulweria* petrel in the Bismarck Sea, Papua New Guinea, in April 2017, is described, together with a review of similar at-sea observations. The affinity of these birds to Fiji Petrel *P. macgillivrayi* is discussed and some suggestions made as to how knowledge of this population might be advanced so that, ultimately, its conservation can be facilitated along with a suite of imperilled Pacific petrels that urgently require safeguards.

The last decade has witnessed a spate of ornithological discoveries in the seas of Melanesia (e.g. Shirihai 2008, Shirihai *et al.* 2009, Bretagnolle & Shirihai 2010, Shirihai & Bretagnolle 2010). These relate to highly threatened populations of Procellariiformes and all represent urgent conservation priorities. Adding to the growing list of enigmatic observations are several sightings of an unidentified all-dark *Pseudobulweria* petrel in the Bismarck Sea (Shirihai 2004, 2008, Flood *et al.* 2017). Here I report an additional sighting and review all records to date.

Observation of an all-dark *Pseudobulweria* petrel in the Bismarck Sea

On 22 April 2017, I observed an all-dark *Pseudobulweria* petrel in Silur Bay, south-east New Ireland, Papua New Guinea, at 04°28'S, 153°06'E, while participating in BirdLife International's recent project researching Beck's Petrel *P. becki* (BirdLife International 2017a). Field work was focused on at-sea capture of Beck's Petrels within Silur Bay to deploy satellite transmitters, with the hope that any tracked individuals might lead us to the species' hitherto unknown breeding sites, by providing accurate fixes for localities on land. I had paddled by kayak to within 200 m of a raft of petrels. At this distance an unfrozen chum mix of ground fish discards, fish oil and fish liver was deployed in a mesh onion bag suspended from a coconut to prevent it from sinking. The raft numbered *c.*20 birds—the swell was obscuring all or part of the raft at any one time, making a more accurate estimate impossible. The birds were identified as Beck's Petrels at a distance from the PNG Explorer, and then a motorised tender. Optical and camera equipment had been left aboard PNG Explorer.

After 20–30 minutes waiting on the kayak the raft of petrels took flight. The birds scattered in various directions, but several flew towards the chum slick. The first bird to reach it appeared all dark from *c.*50 m range. As the individual flew closer, it banked revealing that its underparts, as well as the head and back, were all dark, in stark contrast to the Beck's Petrels which have brown upperparts, head, neck and breast, and white posterior underparts. The bird continued towards the chum making two passes, eventually within 5 m. I fired the net gun on the first close pass the bird made, as it turned across the slick *c.*7 m away. The bird banked easily away from the oncoming net. It made a second pass, fluttering

briefly over the chum bag and, after lingering over the slick with 6–8 Beck's Petrels, it flew off west, further into Silur Bay. In total the observation lasted *c.*2 minutes.

The bird appeared identical structurally to the Beck's Petrels that it accompanied, but it was noticeably smaller. I estimate it was 20% smaller than a Beck's Petrel in wingspan and body length. In terms of overall bulk, it appeared substantially smaller again. The plumage was uniform dark brown, darker than the head and back of Beck's Petrel, approaching black. It was darkest on the head, back and breast, with warmer rustier tones on the belly. In strong light there was a marginally paler underwing panel where the paler bases to the coverts were visible, but this effect was slight. Based on the bird's shape, with Beck's Petrels for direct comparison, there can be no confusion with any of the all-dark tern or shearwater species that could occur in the area. Although I have never seen a *Bulweria* petrel, the most likely confusion species, the uniformly dark upperparts lacking any hint of a paler panel on the greater coverts, and the bird's structure and flight action separate it from that genus. It had the robust bill and rounded head, abrupt cigar-shaped tapering rear body and tail, and stiff-winged flight action of a *Pseudobulweria*, rather than the square storm-petrel-like head and thin bill, long tapering body and erratic flight of a *Bulweria* (Shirihai *et al.* 2009).

This sighting builds on those reported by Shirihai (2004, 2008) and Flood *et al.* (2017) in the Bismarck Sea. With the growing body of sightings of a mystery petrel in the region, the key questions are what is it and what to do next?

To what species/population do these observations pertain?

Fiji Petrel *P. macgillivrayi* is the only all-dark *Pseudobulweria* recorded in the Pacific. Structurally, Shirihai (2009) noted that Fiji Petrel, to some degree, is close in size and structure to Beck's Petrel with which it shares a square head and bulbous compressed bill, but *becki* lacks the distinctive tapering rear of Fiji Petrel. Both Shirihai (2008) and Flood *et al.* (2017) noted that the all-dark birds they observed had a more robust body, larger head and heavier bill, more rounded wings, and shorter and squarer tail than *becki*. I was unable to note any differences in structure between the all-dark bird I saw and the adjacent *becki*—rather one was a miniature version of the other. Following his at-sea observations of Fiji Petrels in Fiji in 2009, Shirihai (2009) concluded that previous observations of all-dark *Pseudobulweria* petrels in the Bismarck Sea in 2003 and 2007 did not involve Fiji Petrel based on shape and flight behaviour, especially jizz. Flood *et al.* (2017) did not specifically comment on structural differences between the all-dark birds they observed and Fiji Petrel. I have seen Fiji Petrel once in Fiji waters (Bird 2012a) and am unable to discern any noticeable difference between that bird and the one seen in April 2017. On structure, there appears to be no conclusive evidence as to whether the Bismarck birds are Fiji Petrels or another taxon.

In terms of size, Shirihai (2008) reported that two of the three all-dark petrels he observed in the Bismarck Sea were overall slightly smaller than *becki*. Flood *et al.* (2017) reported their bird as being *c.*10% smaller than a Beck's Petrel, while I estimated the bird I observed to be 20% smaller based upon direct and close comparison with adjacent Beck's. Comparison of biometrics of Fiji Petrels (from Fiji) with Beck's Petrels suggests their wings are 6–18% shorter, tails 9–16% shorter and they weigh 19–33% less (Table 1). This suggests the all-dark birds observed in the Bismarck Sea are within the same size range as Fiji Petrel, but this is obviously a coarse assessment.

Table 2 updates Priddel *et al.* (2008) and collates sightings of all-dark *Pseudobulweria* petrels at-sea. Although the veracity of reports has not been checked, it is immediately apparent that they come from two geographic areas: ten observations are from Fijian/Tongan waters, and eight from Papua New Guinea. These reflect concentrated efforts to observe Fiji Petrels around Fiji, and Beck's Petrel / Heinroth's Shearwater *Puffinus heinrothi*

TABLE 1
Comparative measurements of Fiji *Pseudobulweria macgillivrayi* and Beck's Petrels *P. becki*.

	Individual	Wing	Tail	Mass (g)	Source
Fiji Petrel specimens	1:	205.0	83.7		Shirihai <i>et al.</i> (2009)
	2:	217.0	91.0	120.0	Shirihai <i>et al.</i> (2009)
	3:	215.0			Shirihai <i>et al.</i> (2009)
	4:	225.0	90.0	145.0	Shirihai <i>et al.</i> (2009)
Fiji Petrel mean		217.0	88.2	132.5	Shirihai <i>et al.</i> (2009)
Beck's Petrel specimens	1:	251.0	100.0		Shirihai (2008)
	2:	244.0	98.0		Shirihai (2008)
	3:	240.0	99.3		Shirihai (2008)
	4:	250.0	103.7	185.0	BirdLife International unpubl. data
Beck's Petrel mean		246.3	100.3	185.0	
Fiji : Beck's difference—max.		82%	84%	65%	
Fiji : Beck's difference—min.		94%	91%	78%	
Fiji : Beck's difference—mean		88%	88%	72%	

in Papua New Guinea. That there have been no reports from intervening waters around the Solomon Islands and Vanuatu, where several at-sea surveys during the last decade have focused on Vanuatu *Pterodroma occulta* and Collared Petrels *P. brevipes* (e.g. Bretagnolle & Shirihai 2010, Shirihai & Bretagnolle 2010, Flood *et al.* 2017), is interesting. Fiji Petrel is listed as Critically Endangered due to its presumed tiny population being confined to a very small breeding area (BirdLife International 2017b). Although species' ecologies differ markedly, it is worth considering, for comparison, other petrels breeding in the western tropical Pacific with purportedly small and range-restricted breeding populations. Vanuatu, 'Magnificent' *P. brevipes magnificens* and Beck's Petrels all meet this description (Bretagnolle & Shirihai 2010, Shirihai & Bretagnolle 2010, Bird *et al.* 2013). Despite increasing ornithological coverage within the region, none of these species has been recorded with certainty more than a few hundred kilometres from the core of their known ranges. This is not to reject the possibility that all of these species do disperse widely, merely that a dilution effect reduces the frequency / likelihood of encounters as distance from the colony increases. For a population as apparently rare as Fiji Petrel is on Gau, it seems very unlikely that birds would be seen with any degree of regularity in the Bismarck Sea, without records from the intervening ocean. Based on the limited comparative evidence available, the most parsimonious explanation is that birds observed in the Bismarck Sea, and those observed in Fiji represent two disjunct populations, and possibly separate taxa.

What next?

Melanesia hosts numerous imperilled petrel populations. Threats are most severe on land, so identifying their breeding colonies is a prerequisite for conservation. Species in the region can be categorised as: (i) studied breeding populations for which threatening processes have been confirmed and / or there are sufficient data to evidence declining population trends, e.g. Collared Petrel on Gau, Fiji (O'Connor *et al.* 2010) and Gould's Petrel *Pterodroma leucoptera* in New Caledonia (BirdLife International 2017c); (ii) known breeding populations where no studies are underway, but declines are inferred or suspected, e.g. Vanuatu Petrel and Collared Petrel on Vanua Lava, Vanuatu (Totterman 2009, Tennyson

TABLE 2
At-sea observations of all-dark *Pseudobulweria* petrels in the western tropical Pacific.

Year	Date	No. of birds	Latitude	Longitude	Approximate location	Source
1964	8 November	1	19°30'S	176°30'W	550 km ESE of Suva, Fiji	Bourne (1967)
1964	31 December	1	24°00'S	178°30'E	650 km S of Suva, Fiji	Bourne (1967)
1965	1 January	1	21°30'S	176°30'W	140 km WSW of Nuku'alofa, Tonga	Bourne (1967)
1965	23 May	1	10°00'S	180°00'E	360 km NE of Rotuma, Fiji	Bourne (1967)
1986	12 June	1	18°00'S	179°13'E	Herald Bay, Gau Island, Fiji	D. Watling <i>in</i> Priddel <i>et al.</i> (2008)
1986	August	1	18°10'S	178°50'E	Between Suva and Gau Island, Fiji	A. Tabaiwalu <i>in</i> Priddel <i>et al.</i> (2008)
1999	early October	1	16°13'S	179°10'E	20 km N of Vanua Levu, Fiji	D. Watling <i>in</i> Priddel <i>et al.</i> (2008)
1999	early October	1	15°55'S	171°59'W	230 km ENE of Tafahi, Tonga	D. Watling <i>in</i> Priddel <i>et al.</i> (2008)
2003	14 August	1	05°00'S	150°20'S	Kimbe Bay, West New Britain, Papua New Guinea	Shirihai (2008)
2007	12 April	1	01°42'S	153°56'E	400 km N of Bougainville, Papua New Guinea	Howell (2007)
2007	31 July	1	04°20'S	153°18'E	Between New Ireland and Feni Islands, Papua New Guinea	Shirihai (2008)
2007	7 August	1	03°51'S	151°31'E	Cape Lambert, New Britain, Papua New Guinea	Shirihai (2008)
2008	April	1			Bismarck Sea, Papua New Guinea	Shirihai <i>et al.</i> (2009)
2009	13–18 May	8	18°27'S	179°10'E	Locations SW of Gau Island, Fiji	Shirihai <i>et al.</i> (2009)
2011	4 May	1	19°00'S	179°58'E	Yasayasa Moala, Fiji	Bird (2012)
2017	21 January	1	04°25'S	153°06'E	Silur Bay, New Ireland, Papua New Guinea	Flood <i>et al.</i> (2017)
2017	22 January	1?			Cape St. George, New Ireland, Papua New Guinea	Flood <i>et al.</i> (2017)
2017	22 April	1	04°28'S	153°06'E	Silur Bay, New Ireland, Papua New Guinea	This study

et al. 2012); (iii) unconfirmed populations suspected to breed on particular islands where threats can be inferred, e.g. Collared Petrels on several Fijian islands (O'Brien *et al.* 2016) and Beck's Petrel on New Ireland (Bird 2012b); and (iv) species only recorded at sea where there is very little evidence to suggest where they might breed, but for which nesting is suspected in the region, e.g. Polynesian Storm Petrel *Nesofregatta fuliginosa* in Fiji and 'Coral Sea Storm Petrel' in New Caledonia. Following the assertion (made above) that observations of an all-dark *Pseudobulweria* in the Bismarck Sea represent a different population to Fiji Petrels around Fiji, this population falls into the final category above. For these populations it is most difficult to know what to do next. Indeed, for most of the known populations there are no conservation actions planned or underway. Conservation capacity in the region is low, there are few resident ornithologists able to gather further data, and field work is both logistically challenging and expensive.

Given these challenges and constraints, adding another population to an already unmanageable list of conservation priorities runs the risk of diluting effort or exacerbating

existing conservation challenges. There is an obvious conservation pathway that could be adopted, from birders identifying populations at sea, to conservation projects that build on that knowledge to identify populations on land, to conservation programmes that implement on-ground actions. Key considerations when collecting at-sea observations are to: record effort in terms of voyage routes (GPS tracks) and start and end times of observation periods; and to publish observations—either in peer-reviewed literature or simply via online repositories such as eBird (<http://ebird.org/content/ebird/>). If future observations identify reliable locations to encounter the all-dark taxon, BirdLife International's recent work on Beck's Petrel provides proof of concept that *Pseudobulweria* petrels can be captured at sea to deploy satellite trackers (BirdLife International 2017a), which in turn has proved an effective tool for locating petrel breeding sites. However, any future attempts to employ this approach should learn from previous work in the region, to improve the reliability of luring birds within capture range, and to develop methods to land birds on the water for easier capture.

The all-dark taxon in the Bismarck Sea should be treated with the same importance as Fiji Petrel, i.e. one of the highest and most urgent avian conservation priorities in the Pacific (BirdLife International 2017b). However, it would be unwise to divert the effort of conservation organisations in the region into searching for unknown breeding grounds while known populations slip away. Overall, it is clear that a substantial investment in the region is needed if we are to avoid losing several petrel populations and species. This population should be included in any strategic plan for Pacific petrels.

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