

# Observations of Matsudaira's, Wilson's and Black-bellied Storm-petrels in the Seychelles

Hadoram Shirihai and Adrian Skerrett

**Abstract** During a pelagic trip to the northern edge of the Seychelles Bank (around 3°48'S 55°40'E), we spent two days using chum to attract seabirds. Data were gathered on the distribution and abundance of several species, some of which are of particular interest to Western Palearctic birders, notably Matsudaira's *Oceanodroma matsudairae* and Black-bellied Storm-petrels *Fregetta tropica*. The results, including photographs, are presented here, together with comments on the identification of these two species in particular.

Little is known about the pelagic birdlife in and around the waters of the Seychelles archipelago in the western Indian Ocean, in particular to the east of the islands. In November 2014, we spent two days at sea off Denis Island (on the northern edge of the Seychelles Bank, around 3°48'S 55°40'E), where we gathered data on the abundance, movements and behaviour of several seabirds, in particular Matsudaira's *Oceanodroma matsudairae*, Wilson's *Oceanites oceanicus* and Black-bellied Storm-petrels *Fregetta tropica*. This is the first large-scale chumming expedition in Seychelles waters, carried out as part of the research for the forthcoming book *Albatrosses, Petrels and Shearwaters of the World* (Shirihai & Bretagnolle in prep.).

## Methods

From Denis Island, we chartered the game-fishing boat *Lady Claire* on 25th and 26th November 2014. At sea, we used the chumming techniques adopted by HS during previous expeditions to the Bismarck archipelago (Papua New Guinea), Gau Island (Fiji), Reunion Island (western Indian Ocean), and Madeira (see Shirihai 2008, 2009 and Shirihai *et al.* 2009, 2014). Prior to our

arrival, large blocks of chum were prepared and then frozen. Each block weighed c. 10 kg and comprised c. 70% grained or cut fish offal and 30% fresh water; these were kept frozen in plastic containers until used. Frozen blocks allow the chum to float longer, thus increasing the chances for storm-petrels to take the food before it sinks, yet still creating a pungent and constant oil slick that drifts downwind and can be detected by birds from a considerable distance.

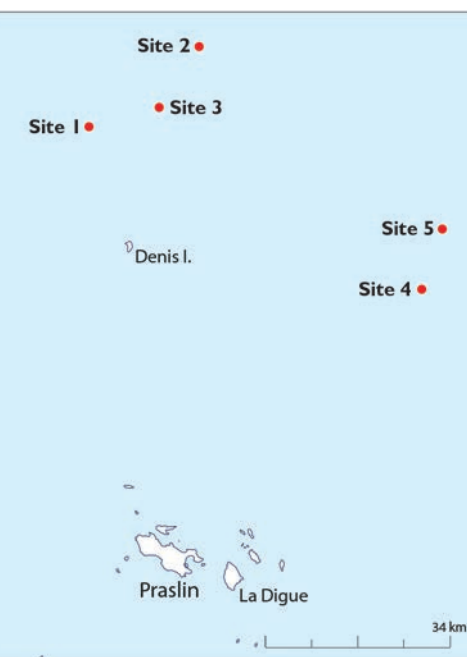
Over the two days we covered five survey areas or 'sites', travelling c. 220 km (120 nautical miles) in total. After we had arrived in a survey area, one or two blocks of chum were dropped overboard at hourly intervals. In total, we used 16 blocks on 25th November and 11 blocks on 26th. Each site was surveyed for 2–4 hours (apart from site 4, where the survey was terminated after 75 minutes owing to the lack of birds). Chumming locations (see table 1 and fig. 1) were selected based on underwater topography, lying close to and along contour lines of the Seychelles Bank, in sea depths of c. 30–900 m. GPS with a marine chart programme was used to establish our positions, the distance between locations and the exact position of sightings.

## Matsudaira's Storm-petrel Identification

This is a large, dark-rumped *Oceanodroma* storm-petrel with a long and deeply forked tail, and typically long and angular wings. It appears very similar to Swinhoe's Storm-petrel *O. monorhis*, from which it can be reliably separated only by its larger size. We observed Matsudaira's Storm-petrels feeding on the chum, often side by side with Wilson's Storm-petrels, when the former appeared considerably larger and bulkier. The tail was felt to be proportionally longer and to show a deeper fork than Swinhoe's but there is variation in tail structure, making this difficult to assess at sea. Swinhoe's was not identified during this survey so a direct comparison between the two species was not possible.

All the Matsudaira's observed showed a whitish patch at the base of the upper surface of the outer primaries, formed by whitish shafts, and often also the feather bases, on up to seven of the outermost primaries. All birds showed a prominent pale diagonal panel across the upperwing (the ulnar bar), from the carpal bend to the trailing edge of the wing, near the base.

During our observations we observed considerable variation in these features. Both Matsudaira's and Swinhoe's show a pale base to the outer primaries, making their separation particularly difficult. Based on extensive observations of the two species by HS in the western Pacific, including Japan, it is considered that there is much overlap in the extent and prominence of the white primary patch and that this is not diagnostic for either. In a minority of Matsudaira's, the white feather bases form a more extensive primary patch than observed on any Swinhoe's, yet in some Matsudaira's the



**Fig. 1.** Locations over the Seychelles Bank to north and east of Denis Island, Seychelles, where observations were undertaken after frozen chum had been used to attract storm-petrels on 25th and 26th November 2014. (See also map on p000 for the position of Denis at a wider scale.)

white patch can be limited, even almost lacking. Observations in the western Pacific also revealed tentative minor differences in the shape and extent of the ulnar bar. Compared with Swinhoe's, the pale sandy-buff ulnar bar on the rear upperwing-coverts of Matsudaira's often appears broader and wider yet less sharply defined from the surrounding darker areas. Towards the front of the wing the pale bar often reaches the leading edge, or falls just short, leaving only a small gap. Swinhoe's typically shows a narrower and more solid ulnar

**Table 1.** Location of survey areas, north and east of Denis Island, Seychelles, November 2014. Totals of storm-petrels recorded are given for each site.

Site	Date	Co-ordinates	Matsudaira's	Wilson's	Black-bellied
en route to site 1	25th Nov		1	1	
1	25th Nov	3°37'S 55°36'E	5	3	
2	25th Nov	3°29'S 55°47'E	4	3	
3	25th Nov	3°35'S 55°43'E	1	3	
4	26th Nov	3°53'S 56°09'E			
5	26th Nov	3°47'S 56°11'E	3	15	1
<b>Total</b>			<b>14</b>	<b>25</b>	<b>1</b>

bar, which does not reach the leading edge.

The observations off Denis Island further reinforced the view that these upperwing features are consistent and characteristic of Matsudaira's (see plates 001–012). However, observers should be cautious when applying them as there is overlap, and the prominence of the ulnar bar varies with viewing angles as well as lighting.

Compared with Swinhoe's, the head and neck of Matsudaira's often shows a sooty or

slaty hue, resulting in a darker appearance that can contrast strongly with the browner body. Swinhoe's is very similar but the body tends to be darker, blackish sooty-brown, so less contrast is apparent between the head and body (although this is visible only on birds observed closely). These slight differences in shade and hue should be regarded only as tendencies, which can be appreciated only with close views and in neutral light conditions.



Tubenoses Project & Extreme Gaffly Petrel Expeditions © Hadoram Shirihai

**001–003.** Matsudaira's Storm-petrel *Oceanodroma matsudairae*, at sea off Denis Island, Seychelles (3°37'S 55°36'E), November 2014. This sequence of one individual illustrates the long wings and relatively long, deeply forked tail of this large, dark-rumped *Oceanodroma*. Note how the apparent shape, size and contrast of the white patch at the primary bases and of the pale upperwing bar appear to change with angle and light. The white patch is created by the white primary shafts but can also extend onto the webs to form a more extensive patch, more evident when the wings are angled backwards (002). The pale bar on the rear upperwing-coverts appears quite broad and wide, yet not especially sharply defined from the surrounding darker wing areas – particularly when the wing is outstretched (001). The leading edge of this wing-bar can, at times, appear well defined and often extends to, or almost to, the leading edge of the wing. At sea this bird was considered to be a small individual, presumably male.

Matsudaira's is also difficult to distinguish from Tristram's Storm-petrel *O. tristrami*, although the latter lacks the white patch at the base of the primaries. Separating Matsudaira's from both Black *O. melania* and Markham's Storm-petrels *O. markhami* of the eastern Pacific is highly challenging and beyond the scope of this paper.

In flight, Matsudaira's appears lethargic and travels with relaxed wingbeats interrupted by moderate to long glides, sometimes giving the impression of an 'accelerating' noddy *Anous*, especially when seen flying away at an angle. Thus, it lacks the quicker flight of a 'typical' Swinhoe's in similar conditions. Notwithstanding this

relatively relaxed flight action, Matsudaira's often travels deceptively fast, and flies consistently low, close to the sea surface, which makes birds difficult to follow; they can disappear rapidly between low waves or against a background of dark water.

### Factors affecting identification

When separating Matsudaira's and Swinhoe's, particular emphasis has been placed on the importance of establishing the size and extent of the whitish patch at the base of the upper surface of the outer primaries. This patch has invariably been described as being larger and/or more prominent or more solidly patterned in



Tubenoses Project & Extreme Gadfly Petrel Expeditions © Hadoram Shirihai

**004–006.** Matsudaira's Storm-petrel *Oceanodroma matsudairae*, at sea off Denis Island, Seychelles (3°37'S 55°36'E), November 2014. Again, note the proportionally long and deeply forked tail, and pronounced ulnar bar (006), most conspicuous on the greater coverts, becoming ill-defined towards the leading edge of the wing; from this angle the bar appears to reach the marginal coverts near the carpal bend. Plate 004 reveals the size-illusion effect with a distant and smaller Wilson's Storm-petrel *Oceanites oceanicus*, which appears misleadingly larger than the Matsudaira's. In 005 this bird is believed to be a small (presumed male) Matsudaira's.

TP&EGPE © Hadoram Shirihai



**007 & 008.** Matsudaira’s Storm-petrel *Oceanodroma matsudairae*, at sea off Denis Island, Seychelles (3°37’S 55°36’E), November 2014. Note how the white patch at the base of the primaries appears to vary in shape with the bend of the wing and angle of view. The ulnar bar (007) may appear better defined and a more obvious gap may be apparent between it and the leading edge from this angle. This bird was again particularly small in the field, presumably male, but was distinctly larger than Wilson’s Storm-petrel *Oceanites oceanicus* when seen side by side.

Matsudaira’s than in Swinhoe’s (e.g. Harrison 1987, Marchant & Higgins 1990, Enticott & Tipling 1997, Sinclair & Langrand 1998, Brooke 2004, Onley & Scofield 2007, Howell & Patteson 2008, Flood & Fisher 2011, Skerrett & Disley 2011, Safford & Hawkins 2013). Variation in contrast in the pale upperwing ulnar bar was discussed by Howell & Patteson (2008), and its exact extent on the upperwing-coverts was described by Flood & Fisher (2011). Yet other than the last two references, the variation and extent of overlap in the appearance of the upperwing of the two species has been poorly described. We emphasise that both the primary patch and the ulnar bar of Matsudaira’s are variable and in terms of separation from Swinhoe’s they should be treated as subsidiary features only and used with extreme care.

If estimated correctly, the larger size of Matsudaira’s is the most important feature

for separation from Swinhoe’s, at least in the western Indian Ocean. However, observers faced with one of these dark-rumped storm-petrels should bear in mind two caveats. Firstly, with lone individuals, it takes time to assess the true size of a petrel (and this impression can often change during the observations owing to the mode of flight, angle to the observer, lighting conditions, etc.). Even with previous experience of both species, we found it difficult to gauge the size accurately, but the presence of Wilson’s Storm-petrels alongside on several occasions helped us to estimate their true size. Secondly, we found considerable individual size variation in the Matsudaira’s observed, with some (probably males) appearing distinctly smaller and others (probably females) notably larger and heavier. As a rough guide, Matsudaira’s appears c. 30% larger than Wilson’s (in terms of wingspan and total

TP&EGPE © Hadoram Shirihai



**009 & 010.** Matsudaira’s Storm-petrel *Oceanodroma matsudairae*, at sea off Denis Island, Seychelles (3°37’S 55°36’E), November 2014. The white primary patch is particularly poorly developed and was hardly visible at sea on this individual. This bird also has a heavily worn tail, giving it a shorter-tailed structure, and it is replacing some rectrices.



TP&EGPE © Hadoram Shirihai

**011 & 012.** Matsudaira's Storm-petrel *Oceanodroma matsudairae*, at sea off Denis Island, Seychelles (3°37'S 55°36'E), November 2014. A feeding sequence showing another small bird (presumed male).

length), whereas Swinhoe's is only c. 15% larger. Yet in terms of the overall impression, Matsudaira's appears almost twice as large and heavy as Wilson's, as a consequence of its body mass being around 40% greater. Consequently, we believe that, eventually, most Matsudaira's should be identified by their larger size if seen with other storm-petrels.

We found no clear correlation between overall size and the prominence of the upper-wing markings, although rather small Matsudaira's with poorly developed wing markings (e.g. plates 004–006 & 009–012) can strongly resemble Swinhoe's Storm-petrels. This potential pitfall has not been adequately described or discussed in the literature.

### Behaviour

All 14 Matsudaira's Storm-petrels encountered off Denis Island behaved very differently from the birds HS has observed previously around the Bonin Islands in southern Japan, and the Bismarck archipelago off northern Papua New Guinea, all of which lingered around chum. In contrast, the Seychelles birds remained on the chum for a very short time and would not tolerate a close approach by the boat; most encounters were brief, and at a range of 30–200 m. In the Pacific, Matsudaira's is inclined to follow ships and is a particularly aggressive scavenger; typically, tens of birds remain on the chum to feed in tight groups until the food is finished, with some individuals remaining for several hours. The behaviour of Matsudaira's off the Seychelles was more similar to that of the typically more elusive Swinhoe's in the Pacific (HS pers. obs.), where it is wary of a close approach. We cannot explain these

differences in behaviour, but it does suggest that the degree to which birds will approach boats or chum is an unreliable ID character (e.g. Enticott & Tipling 1997).

### Status of Matsudaira's Storm-petrel in the western Indian Ocean

There has been just one previous record of Matsudaira's Storm-petrel in the Seychelles recording area: two birds observed between Providence and Alphonse in August 2000 (Skerrett *et al.* 2006, 2007). This is the only fully documented record from anywhere in the western Indian Ocean, although there are various other published reports that lack descriptions, making them impossible to verify (e.g. Gill 1967, Bailey 1968, Seitre 1997, Louette 2004, Clément *et al.* 2008). There are three Seychelles records of Swinhoe's Storm-petrel: one found alive but later died at Praslin in October 1996 (specimen now at the Natural History Museum, Tring), one at sea between Aldabra and Assumption in October 1996 and another in the same location in December 1998 (Skerrett *et al.* 2006, 2007).

### Known world range and migration

Matsudaira's Storm-petrel is known to breed only on the Volcano Islands in southern Japan. Outside the breeding season it apparently migrates to the Timor Sea off northwest Australia, and then west into the Indian Ocean. There has been a widely held assumption that it winters mostly in the equatorial belt around the Seychelles and west to East Africa but proof has been lacking. The global population is thought to be at least 20,000 individuals (Brooke 2004).

The presence of Matsudaira's Storm-petrels at four of the five chumming sites we visited provides a tantalising clue into a possible wintering area. With only one previous record from the entire western Indian Ocean, it may be that the seas above the Seychelles Bank represent an undiscovered wintering ground. However, more information is needed (see below).

### Wilson's Storm-petrel Identification

Wilson's Storm-petrel is the 'default' storm-petrel of the southern oceans, by far the most likely species to be encountered, and its identification is relatively straightforward. It is a

small and compact white-rumped storm-petrel with rather rounded wings and square-ended tail, and mostly blackish to sooty-brown plumage. Its most noticeable features include the bold white rump patch extending to the sides of the vent, and the pale greater coverts that form an ulnar bar, evident in flight. The underwing is predominantly sooty-brown with a variable greyish-white wash to the underwing-coverts (not always visible). The remainder of the underparts are entirely dark. When the legs are extended, the yellow webbing between the toes may be visible, though it often takes some time to see this feature at sea.

It flies on typically rather short, rounded wings, with a hirundine-like jizz and action; the flight is not particularly erratic or buoyant, with moderate bounding. It usually flies rather slowly and close to the sea surface, especially when foraging. It can, however, be more direct and faster in active flight and windy conditions, with rapid wingbeats interspersed by short glides (Shirihai 2007). Flood & Fisher (2011) and Howell (2012) provided greater identification insight and discussion of separation from similar species.

### Behaviour

When feeding on chum, singles or small groups flutter close to the sea surface with legs dangling and feet dipping into the sea. They take small, loose pieces of chum from or just below the surface by dipping or pattering; the latter involves bouncing and walking on the water source, with the assistance of partially open wings against the wind. The legs are retracted for more purposeful flight.



**013 & 014.** Wilson's Storm-petrel *Oceanites oceanicus*, at sea off Denis Island, Seychelles, November 2014. Note the bold white rump patch extending to the vent sides, the pale upperwing-coverts forming an ulnar bar, and the somewhat pale wash along the underwing-coverts (not always visible); long feet projecting beyond the square-ended tail are diagnostic.

### Status of Wilson's Storm-petrel in the western Indian Ocean

There have been six accepted records involving 11 individuals within the Seychelles recording area, in October–November, April and July (Skerrett *et al.* 2011). Elsewhere in the western Indian Ocean it is recorded mainly in April–May and October–November, suggesting passage migration (Safford & Hawkins 2013). Systematic observations indicate that it is uncommon and greatly outnumbered by Black-bellied Storm-petrel (Le Corre 2002) but it was considered common by, for example, Barré (1983), Payet *et al.* (1995) and Barré *et al.* (1996).

### Known world range and migration

Wilson's breeds in ice-free regions of the Antarctica and the sub-Antarctic islands. Outside the breeding season, it disperses widely, crossing the equator in all oceans to spend the northern summer in the North Pacific and North Atlantic Oceans.

Our observations, in late November, are not inconsistent with records of this species elsewhere. Wilson's Storm-petrels generally migrate north in April–June, and return from September to November, although some remain as late as December or even January in the North Atlantic off North America. They may move in a clockwise direction around the Pacific and Atlantic Oceans, although both northbound and southbound passage is apparently evident off the east coast of North America. It is possible that a clockwise migration also occurs in the Indian Ocean, which would suggest that birds should be less numerous on southbound migration in the western Indian Ocean (and hence at the time of our study).

### Black-bellied Storm-petrel

The one individual recorded, at site 5, appeared at 13.30 hrs and remained until our departure c. 20 minutes later (plate 015).

### Identification

This is a medium to large, well-built but rather compact storm-petrel (the size at sea never appears as large as measurements suggest), with rounded wings and square-ended, relatively short tail. It is mainly black above except for a dark brown mantle and

upperwing-coverts, paler ulnar bar and sharply contrasting broad white lower rump and uppertail-coverts. The underwing-coverts form a large white panel in the central underwing, outlined by broad black leading and trailing edges. The underparts, flanks and undertail-coverts are white, and merge with the white underwing- and uppertail-coverts. The extent of dark feathering on the vent and centre of the belly varies between individuals; on the bird we observed, the black line running down the centre of the belly could be detected and confirmed only by photographic evidence (see below). The bill is black with prominent tubular nostrils, legs and feet are black.

The flight is rather erratic, often involving some zig-zagging, as it repeatedly drags its feet or 'bounds' off water, while rocking from side to side on shallow wingbeats while remaining close to the sea surface.

If the black central belly stripe is present and observed, then separation from White-bellied Storm-petrel *F. grallaria* is straightforward. Other differences between the two are slight and difficult to assess. Black-bellied usually appears longer-legged and its feet clearly project beyond the tail tip, but this varies individually and is, in general, extremely difficult to observe at sea. In some Black-bellied, foot projection may be lacking, and these birds are inseparable from White-bellied on this character. In areas (and seasons) when both species can occur, difficult birds or those seen poorly are best left unidentified.

Within the Seychelles recording area and Malagasy region, only a handful of Black-bellied have been confirmed and its precise status is yet to be determined. There are two published sight records of White-bellied from the western Indian Ocean but both lack supporting details (Safford & Hawkins 2013) and its precise status remains to be determined. Yet it has been described as an uncommon winter visitor and mapped as present throughout the entire Malagasy region (Sinclair & Langrand 1998). Shirihai (2007), Flood & Fisher (2011) and Howell (2012) provided more detail on variations and pitfalls.

### Behaviour

This bird fed in loose association with Wilson's Storm-petrels, flying low over the



sea, rocking from side to side and dipping towards the surface, feet skipping off the water. It did not patter on the surface in a manner similar to that shown by Wilson's but dipped its head towards the surface while holding its wings high over its back.

### Status of Black-bellied Storm-petrel in the western Indian Ocean

There are two previous records in the Seychelles recording area, in June 2010 and July 2014. The species has been reported elsewhere in the western Indian Ocean, mainly in the south, but generally without details. This additional record adds little to establishing its true status in the seas around the Seychelles.

### Known world range and migration

Black-bellied Storm-petrel breeds on Antarctic and sub-Antarctic islands in the southern Indian Ocean, Scotia Sea and south of New Zealand (Brooke 2004). In the austral winter some remain south, dispersing throughout the southern oceans, but many move north into the Indian Ocean, where it is abundant off the Arabian Peninsula in August and September (Marchant & Higgins 1990).

### Other seabirds encountered

Within sight of Denis we encountered White-tailed Tropicbird *Phaethon lepturus*, Bridled *Onychoprion anaethetus* and White Terns *Gygis alba*, Brown *Anous stolidus* and Lesser Noddies *A. tenuirostris*, all of which breed on Denis or other nearby islands on the Seychelles Bank. In the vicinity of the chumming sites small numbers of Lesser Noddies and a few White Terns were seen. Wedge-tailed Shearwaters *Puffinus pacificus* were also encountered, in singles, pairs or flocks of up to 20 birds, especially at sites farthest from land. Wedge-tailed Shearwaters breed at in small numbers on Denis and other nearby islands in much larger numbers. A single Flesh-footed Shearwater *Ardenna carneipes* was seen at site 2 associating with c. 15 Wedge-tailed Shearwaters. The Flesh-footed Shearwater breeds mostly in Australasia although an isolated population of 400–600 pairs breeds on St Paul in the southern Indian Ocean (Marchant & Higgins 1990). Occasional sightings of up to three Red-footed Boobies *Sula sula*, mainly subadults, were made especially on 26th November at sites far from land. This species also breeds in the southern islands and atolls of the Seychelles.

Tubenoses Project & Extreme Gaffly Petrel Expeditions © Hadoram Shirihai



015. Black-bellied Storm-petrel *Fregetta tropica*, at sea off Denis Island, Seychelles, November 2014. The diagnostic black central line on the belly appears obvious in this photograph, but during much of the observation period it was undetectable. Note also the feet projecting behind the tail-tip.

### Scope for further studies

Matsudaira's Storm-petrel has previously been considered to be a scarce migrant to the Malagasy region (e.g. Safford & Hawkins 2013). The number of birds we observed in two days is similar to the total of all historical reports from the Malagasy region combined, although only one of these has any verifiable documentation. Despite the lack of verifiable records, the species has been assumed to winter from the Seychelles west to Kenya, departing from September until November (del Hoyo *et al.* 2014). Our observations confirm the presence of birds off the Seychelles Bank until late November. Reports of Matsudaira's Storm-petrels from the British Indian Ocean Territory (BIOT) confirm occurrences c. 1,850 km to the east in the central Indian Ocean at the same time of year (Carr 2014). It is possible that these observations indicate a later departure date or alternatively perhaps the presence of non-breeders in the Indian Ocean all year round.

The discovery of 14 Matsudaira's Storm-petrels at the Seychelles Bank suggests that this may be a significant wintering site, while the sightings of 25 Wilson's and a single Black-bellied Storm-petrel are significant given the paucity of authenticated sightings of these species in the western Indian Ocean. Both may occur more frequently than the number of previous records suggests, particularly Wilson's, which has been reported more frequently in the western Indian Ocean than any other storm-petrel, but most sightings generally lack supporting documentation or specimens (Safford & Hawkins 2013). Additional surveys are required to confirm the seasonal presence of birds; they may be present throughout the austral winter or perhaps some non-breeders may remain here year-round.

This expedition provided a brief glimpse into what may be occurring in the western Indian Ocean. It produced intriguing results and considerably increased the number of storm-petrels recorded in the western Indian Ocean. Further chumming trips are needed at different times of year to assess seasonality and at different locations to assess distribution, of all species. A future assessment of pelagic seabird distribution should take into

consideration other locations around the Seychelles Bank.

### Acknowledgments

Thanks are due to game-fishing boat skipper Rolly Pierre for his patience and adaptability to the requirements of ornithologists chumming for petrels, and also to Mickey Mason for overseeing the preparation in advance of frozen chum to the required standards.

### References

- Bailey, R. S. 1968. The pelagic distribution of seabirds in the western Indian Ocean. *Ibis* 110: 493–519.
- Barré, N. 1983. Oiseaux migrateurs observés à la Réunion (Océan Indien). *Oiseaux et Revue Française d'Ornithologie* 53: 323–333.
- , Barau, A., & Jouanin, C. 1996. *Oiseaux de la Réunion*. 2nd edn. Éditions du Pacifique, Paris.
- Brooke, M. 2004. *Albatrosses and Petrels Across the World*. Oxford University Press, Oxford.
- Carr, P. 2014. New and interesting bird records from the British Indian Ocean Territory (BIOT). *Sea Swallow* 63: 78–86.
- Clément, M., de Grissac, P., & Rolland, R. 2008. *Les Oiseaux de Mayotte*. Naturalistes de Mayotte, Mamoudzou.
- del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A., & de Juana, E. (eds.). 2014. *Handbook of the Birds of the World Alive*. Lynx Edicions, Barcelona: [www.hbw.com](http://www.hbw.com)
- Enticott, J., & Tipling, D. 1997. *Photographic Handbook of the Seabirds of the World*. New Holland, London.
- Flood, B., & Fisher, A. 2011. *Multimedia Identification Guide to North Atlantic Seabirds: Storm-petrels & Bulwer's Petrel*. Pelagic Birds & Birding, Isles of Scilly.
- Gill, F. B. 1967. Observations on the pelagic distribution of seabirds in the Western Indian Ocean. *Proceedings of the United States National Museum* 123: 1–33.
- Harrison, P. 1987. *Seabirds of the World: a photographic guide*. Christopher Helm, London.
- Howell, S. N. G. 2012. *Petrels, Albatrosses, and Storm-Petrels of North America: a photographic guide*. Princeton University Press, Princeton.
- , & Patteson, J. B. 2008. A Swinhoe's Petrel off North Carolina, USA and a review of dark storm-petrel identification. *Birding World* 21: 255–262.
- Le Corre, M. 2002. Observations de pétrels tempêtes en mai 2002 au large de la Réunion. *Lettre de Information (SEOR)* 4: 4–5.
- Louette, M. 2004. Oiseaux. In: Louette, M., Meirte, D., & Jacqué, R. (eds.), *La faune terrestre de l'archipel des Comores*, pp. 91–196. Musée Royal de l'Afrique central, Tervuren.
- Marchant, S., & Higgins, P. J. (eds.). 1990. *Handbook of Australian, New Zealand and Antarctic Birds. Vol. 1: Ratites to Ducks*. Oxford University Press, Melbourne.
- Onley, D., & Scofield, P. 2007. *Albatrosses, Petrels and Shearwaters of the World*. Helm, London.
- Payet, M., Louisin, J.-M., & Probst, J.-M. 1995. Les oiseaux marins erratiques et migrateurs rares répertoriés à la Réunion. *Bulletin Phaethon* 1: 9–13.
- Safford, R. J., & Hawkins, A. F. A. (eds.). 2013. *The Birds of Africa, Vol. VIII: the Malagasy Region*. Christopher Helm, London.

- Seitre, R. 1997. Visite aux Iles Eparses: compte rendu ornithologique. *Working Group on Birds of the Madagascar Region Newsletter* 7(1): 3–7.
- Shirihai, H. 2007. *A Complete Guide to Antarctic Wildlife: the birds and marine mammals of the Antarctic Continent and the Southern Ocean*. 2nd edn. A & C Black, London.
- . 2008. Rediscovery of Beck's Petrel *Pseudobulweria becki*, and other observations of tubenoses from the Bismarck archipelago, Papua New Guinea. *Bulletin of the British Ornithologists' Club* 128: 3–16.
- . 2009. The Zino's Petrel at sea expedition II – and the best pelagic birding in the Western Palearctic. *Birding World* 22: 204–218.
- , Pym, T., San Román, M., & Bretagnolle, V. 2014. The Critically Endangered Mascarene Petrel *Pseudobulweria aterrima*: identification and behaviour at sea, historical discovery of breeding sites, and breeding ecology on Réunion, Indian Ocean. *Bulletin of the British Ornithologists' Club* 134(3): 194–223.
- , Pym, T., Kretzschmar, J., Moce, K., TAUKEI, A., & Watling, D. 2009. First observations of Fiji Petrel *Pseudobulweria macgillivrayi* at sea: off Gau Island, Fiji, in May 2009. *Bulletin of the British Ornithologists' Club* 129: 129–148.
- Sinclair, I., & Langrand, O. 1998 *Birds of the Indian Ocean Islands*. Struik Nature, Cape Town.
- Skerrett, A., Betts, M., Bullock, I., Fisher, D., Gerlach, D., Lucking, R., Phillips, J., & Scott, B. 2006. Third Report of the Seychelles Birds Records Committee. *Bulletin of the African Bird Club* 13: 170–177.
- Skerrett, A., & Disley, T. 2011. *Birds of Seychelles*. Christopher Helm, London.
- , Betts, M., Bowler, J., Bullock, I., Fisher, D., Lucking, R., & Phillips, J. 2011. Fourth report of the Seychelles Bird Records Committee. *Bulletin of the African Bird Club* 18: 182–192.
- , Betts, M., Bullock, I., Fisher, D., Gerlach, R., Lucking, R., Phillips, J., & Scott, B. 2007. *A Checklist of the Birds of Seychelles*. Seychelles Bird Records Committee, Victoria.

*Hadoram Shirihai and Adrian Skerrett, PO Box 336, Victoria, Seychelles or Hazeley Brook, Keele Road, Keele, Staffs ST5 5AL; e-mail [albatross\\_shirihai@hotmail.com](mailto:albatross_shirihai@hotmail.com) [askerrett@hotmail.com](mailto:askerrett@hotmail.com)*

