

The occurrence and status of black-and-white *Puffinus* shearwaters on the Kenyan and Tanzanian coasts, with the first specimen records of Persian Shearwater *P. persicus persicus*

Authors: Bradley, James, Shema, Sidney, and Gijsbertsen, Jaap

Source: Bulletin of the British Ornithologists' Club, 143(1) : 74-84

Published By: British Ornithologists' Club

URL: <https://doi.org/10.25226/bboc.v143i1.2023.a5>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

The occurrence and status of black-and-white *Puffinus* shearwaters on the Kenyan and Tanzanian coasts, with the first specimen records of Persian Shearwater *P. persicus persicus*

by James Bradley, Sidney Shema & Jaap Gijsbertsen

Received 9 August 2022; revised 8 November 2022; published 6 March 2023

<http://zoobank.org/urn:lsid:zoobank.org:pub:B183B230-372A-4E92-AF10-65B758022685>

SUMMARY.—We review specimens and sight records of small black-and-white *Puffinus* shearwaters in Kenya and Tanzania. An early specimen of an Audubon's Shearwater *P. lherminieri sensu lato* found inland at Limuru, Kenya in October 1963, long held to represent taxon *bailloni* (now treated as Tropical Shearwater *P. bailloni*), is reassigned here to *P. b. nicolae*. We refer three other specimens and two well-documented sight records to Persian Shearwater *P. persicus persicus* and a third sight record in northern Tanzania to *P. persicus*. We suggest that nominate *persicus* is a regular visitor to the central Kenya coast in December–March, probably as far south as the Pangani region of north-east Tanzania at least, concurrent with a seasonal upwelling event on the Kenya Banks associated with the north-east monsoon. Tropical Shearwater, however, is no more than a rare visitor to East African shores based on current evidence. Our data clarify the status of these shearwaters in the region, provide additional biometric data to complement published sources, and extend the western Indian Ocean non-breeding range of the nominate subspecies of Persian Shearwater approximately 2,000 km south from northern Somalia.

The identification and taxonomy of small black-and-white shearwaters at tropical latitudes have presented numerous challenges. In the western Indian Ocean, and in the Pacific and Atlantic Oceans, several taxa now recognised as species were formerly considered a single wide-ranging species, Audubon's Shearwater *P. lherminieri*, with *P. l. bailloni* in the western Indian Ocean, and *P. l. persicus* thought to be restricted to the Arabian Peninsula (Onley & Scofield 2007). Today, the taxa *bailloni* and *persicus*, along with an additional three taxa described from the Indian Ocean since 1971, are typically treated as two species (e.g., Austin *et al.* 2004, Gill *et al.* 2021) as follows (with Audubon's Shearwater *P. lherminieri* now restricted to the North Atlantic).

Persian Shearwater *P. persicus* is represented by the nominate subspecies breeding off southern Arabia and *P. p. temptator* in the Comoros (Louette & Herremans 1985, Porter *et al.* 1996, Safford & Hawkins 2013, Flood & Fisher 2020).

Tropical Shearwater *P. bailloni* comprises the nominate subspecies on Mauritius, Réunion and Europa, and *P. b. nicolae* (including *atrodorsalis* and *colstoni* as synonyms) in the waters around Aldabra, Seychelles, Maldives and Chagos Islands (Penny 1986, Shirihai & Christie 1996, Onley & Scofield 2007).

These shearwaters are generally similar in appearance and field criteria permitting their separation have been addressed in detail only comparatively recently (Louette & Herremans 1985, Shirihai & Christie 1996, Onley & Scofield 2007, Shirihai & Bretagnolle 2015, Flood & Fisher 2020). Such birds have long been known to inhabit inshore waters

(3–25 km) off Kenya but hitherto there were no published records from Tanzania (Britton 1980, Zimmerman *et al.* 1996; N. Baker *in litt.* 2022) and no detailed regional studies of the complex.

In Kenya, these shearwaters were first identified as Audubon's Shearwater *sensu lato* on the basis of a bird found alive 600 km inland at Limuru, central Kenya, in October 1963 (now at the American Museum of Natural History, New York; AMNH). It was referred to the only Indian Ocean taxon known from the equatorial zone at the time, *P. l. bailloni* (Britton 1980). Since then, several additional coastal specimens of small black-and-white shearwaters have been acquired by National Museums of Kenya, Nairobi (NMK), and there have been numerous sight records in Kenyan waters (including one photographed at sea). Based on the Limuru specimen being referred to *bailloni*, subsequent records have been universally also ascribed to Tropical Shearwater, presumably *P. b. bailloni* (Zimmerman *et al.* 1996, Stevenson & Fanshawe 2020).

There has been no reassessment of the existing specimen material or the sight records, despite the description of three additional taxa of small black-and-white shearwaters in the western Indian Ocean since 1963 (*nicolae*, *temptator* and *colstoni*), and a greatly refined understanding of relevant identification criteria and taxonomy (e.g., Shirihi & Christie 1996, Austin *et al.* 2004, Howell & Zufelt 2019, Flood & Fisher 2020). Moreover, a published account of *P. persicus* (at the time treated under *P. lherminieri*) in coastal Kenya (Brown 1973, Mann 1976, Brown *et al.* 1982) has been widely overlooked, although Stevenson & Fanshawe (2020) speculated that *persicus* seems likely to occur in the region.

Here, we present a review of the literature and sight records of small black-and-white shearwaters in Kenya, and examine the specimen evidence. We also provide details of a recent photographic record from northern Tanzania, but our principal aim is to determine which taxa are present in Kenya waters, and when and where they occur.

Methods

The specimen database VertNet and the Global Biodiversity Information Facility were searched for historical records, although none was found. Specimens from Kenya at NMK and AMNH were examined, measured and photographed by T. Imboma and A. Kramer respectively. Specimens at NMK were also examined by SS. Measurements taken were of wing (chord), tail (tip to insertion), tarsus (from the depression in the angle of the intertarsal joint to the base of the last complete scale before the toes diverge) and exposed culmen (feathers to tip). Label data such as mass and bare-part colours were also transcribed where available.

Sight records were collated from the literature, as well as from a local e-mail forum (KenyaBirdsnet) and an open-access web application (eBird). Additionally, some records were forwarded to the authors by D. A. Turner. Sight records included here are those considered by us to have been reliably reported based on our knowledge of the observers.

To assess both specimens and sight records, we followed identification criteria described for Persian and Tropical Shearwaters by Harrison (1983), Louette & Herremans (1985), Shirihi & Christie (1996), Onley & Scofield (2007), Shirihi & Bretagnolle (2015), Howell & Zufelt (2019) and Flood & Fisher (2020). We also made extensive comparisons with photographs of these species available on online databases including Macaulay Library and iNaturalist.

Results

Specimen records.—Details of the four specimens examined for this study (Fig. 1) are presented below in chronological order, whilst biometric data are presented in Table 1.

1. *Puffinus bailloni nicolae* (AMNH 788928), collected 18 October 1963, 600 km inland at Limuru, 30 km north of Nairobi, Kenya; plumage fresh (Fig. 1D). Reassessment shows this specimen to be the subspecies *nicolae* of Tropical Shearwater, and not nominate *bailloni* as has long been accepted. The strong pectoral patches unequivocally identify it as a Tropical Shearwater, but the dark undertail-coverts eliminate *P. b. bailloni*, these feathers being extensively white in that taxon (Onley & Scofield 2007, Howell & Zufelt 2019, Flood & Fisher 2020) or occasionally mixed white and brown (V. Bretagnolle *in litt.* 2022). *P. b. bailloni* is further discounted by the short culmen, 26.95 mm, vs. 28.5–31.0 mm in the sample of *bailloni* measured by Louette & Herremans (1985). Indeed, all of the biometrics of AMNH 788928 match well with the data for *P. b. nicolae* given by Louette & Herremans (1985) (Table 1).

2. *Puffinus persicus persicus* (NMK B8032), collected 16 March 1976, 3–4 km off Msambweni, near Shimoni, Kenya; plumage worn (Fig. 1C). The first specimen record of Persian Shearwater in Kenya. Its measurements, however, fall largely outside the known ranges for *persicus* provided by Louette & Herremans (1985) for a sample of just five birds, but the bird's plumage is conclusive. The absence of pectoral patches eliminates either taxon

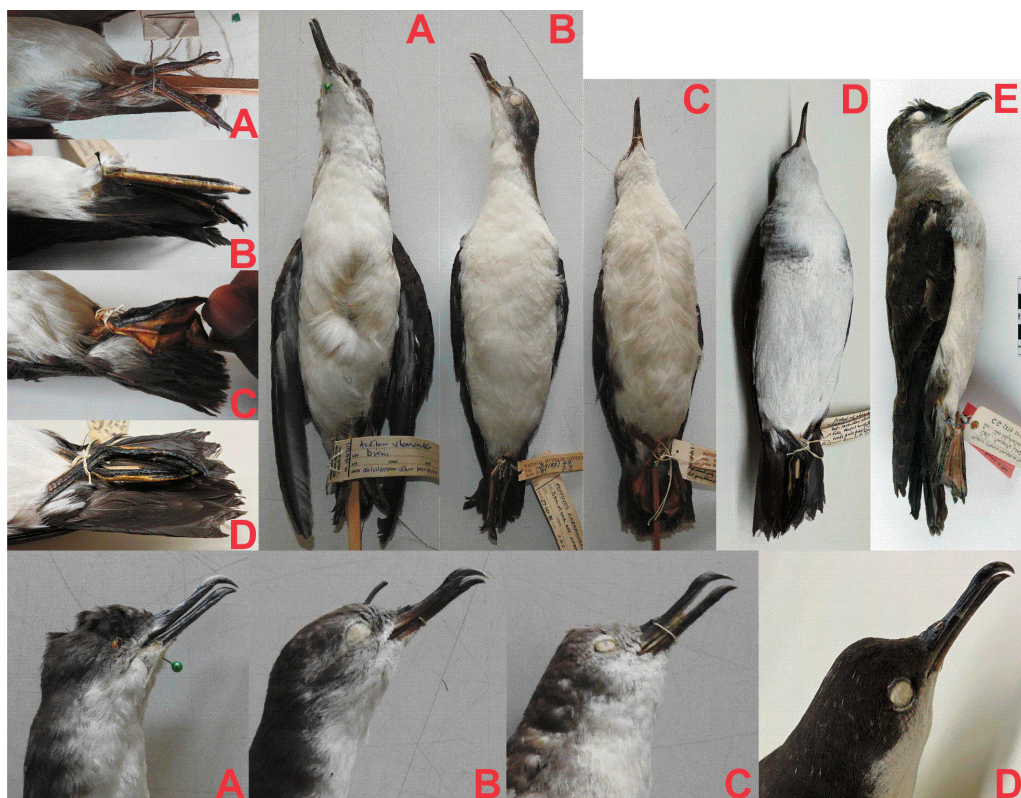


Figure 1. Specimens of Persian Shearwater *Puffinus persicus persicus* (A) NMK 1442019 (Sidney Shema), (B) NMK B9189 (Sidney Shema), (C) NMK B8032 (Sidney Shema) and Tropical Shearwater *Puffinus bailloni nicolae* (D) AMNH 788928 (© Augie Kramer) collected in Kenya between 1963 and 2019, alongside a paratype of *P. b. nicolae* (E) MNHN-ZO-MO-1878-1051 (www.science.mnhn.fr/institution/mnhn/collection/zo/item/search?lang=en_US) from the Seychelles. Birds not to scale.

TABLE 1
Biometric data for four specimens of *Puffinus* shearwaters collected in Kenya, with comparative measurements for each of the five taxa present in the western Indian Ocean. ¹ Mean mass from Bretagnolle *et al.* (2000). ² All measurements are mean values.

Taxon Origin	Mass (g)	Wing (mm)	Tail (mm)	Tarsus (mm)	Culmen (mm)	Reference
<i>nicolae</i> (n = 13)						Louette & Herremans (1985)
Seychelles and Laccadives	168 ¹	181–197	67.0–78.5	35.5–39.5	25.5–29.0	
<i>nicolae</i>						
Limuru, Kenya	177	188	73	38.4	26.95	AMNH 788928
<i>persicus</i> (n = 5)						Louette & Herremans (1985)
Somalia, Oman, Iran, Yemen	---	197.5–213.0	69.5–74.0	38.0–40.0	31.0–33.0	
<i>persicus</i>						
Msambweni, Kenya (offshore)	213	185	60	35.5	29.7	NMK B8032
<i>persicus</i>						
Mtwapa, Kenya (offshore)	---	197	60	36.5	29.9	NMK B9189
<i>persicus</i>						
Diani, Kenya (onshore)	---	206	70	36.5	31.5	NMK 1442019
<i>bailloni</i> (n = 12)						Louette & Herremans (1985)
Réunion and Mauritius	217 ¹	198–206	74.0–81.5	37.5–42.0	28.5–31.0	
<i>colstoni</i> (n = 8)						Bretagnolle <i>et al.</i> (2000) ²
Aldabra	214	199.0	80.5	40.8	26.9	
<i>temptator</i> (n = 1)						Louette & Herremans (1985)
Comoros	---	>203.0	86.0	40.5	31.0	

of Tropical Shearwater, whilst the largely dark undertail further rules out *P. b. bailloni*. Dark axillaries and dense brown streaking on the flanks are evident on close inspection, and combined with the lack of pectoral patches are indicative of Persian Shearwater (Harrison 1983, Onley & Scofield 2007, Howell & Zufelt 2019, Flood & Fisher 2020). Details of the head and upperparts permit separation of the two *P. persicus* subspecies. In NMK B8032, the upperparts are noticeably brown (more so than we have seen in photographs of *temptator*) and the dark cheeks are only indistinctly demarcated from the white underparts, consistent with photographs of nominate *persicus*) from Arabia (eBird) but less so with *P. p. temptator* (or with either subspecies of Tropical Shearwater) as shown in Shirihai & Bretagnolle (2015). Additionally, the latter birds all show white axillaries, whereas this tract is brownish in NMK B8032.

The biometric data add to our knowledge of *persicus* (Table 1). The wing of 185 mm and tail of 60 mm are 10 mm or more less than the smallest value reported by Louette & Herremans (1985), while the culmen and tarsus are also shorter than previously reported for *persicus*. Despite these discrepancies (see Discussion), we are confident of the identification based on the appearance of the flanks, axillaries and underwing, and attribute the biometric differences to the very small sample size from which *persicus* is known (see Discussion).

3. *Puffinus persicus persicus* (NMK B9189), collected 27 December 1981, 3 km off Mtwapa Creek, Kilifi, Kenya; plumage worn (Fig. 1B). The second specimen record of the species in Kenya. Like the previous bird (albeit to a lesser extent), the wing, tail, culmen and tarsus



Figure 2. Persian Shearwater *Puffinus persicus persicus* off Oman (left ML 155569281; © Marcel Gil Velasco) and United Arab Emirates (right ML 93690941; © Tommy Pedersen) alongside the December 1981 specimen from Mtwapa Creek, Kenya (centre NMK B9189; Sidney Shema), showing typical pattern of wear and fading on head producing white grizzling / streaking, and a poorly demarcated border between cheeks and throat.

measurements (Table 1) are all smaller than published data for Persian Shearwater (Louette & Herremans 1985). However, the bird's appearance is again distinctive by virtue of the lack of pectoral patches and presence of heavy greyish-brown streaking on the thighs and lower flanks, eliminating both subspecies of *P. bailloni*, which show white axillaries and flanks (Onley & Scofield 2007, Howell & Zufelt 2019, Flood & Fisher 2020). While the underwing and axillaries could not be examined closely without damaging the specimen, details of the head provide unequivocal support for the identification. Although care must be taken to interpret head plumage of specimens as taxidermy can distort the true appearance (Flood & van der Vliet 2019), the distinct white streaking / grizzling on dark areas in front of and behind the eye, and weak demarcation between the dark cheeks and white throat are consistent with many individuals of nominate *persicus* (Macaulay Library images; Fig. 2); these areas are darker and less distinctly marked in *temptator* (Shirihai & Bretagnolle 2015). Supporting features include some brownish tones to the greyish-black upperparts, as well as pink legs, feet and webs with a black outer edge, as detailed on the specimen's label.

4. *Puffinus persicus persicus* (NMK 1442019), collected 26 February 2019, beached at Diani, Ukunda, Kenya: plumage fresh (flight feathers and tail) or mix of fresh and old feathers (body and head) (Fig. 1A). The bird was photographed alive (Fig. 3) before it succumbed to injuries sustained from crows (*Corvus*) and was subsequently prepared as a study skin. The third specimen record of nominate *persicus* for Kenya and confidently referred to this taxon based on both morphometrics and plumage. Wing, tail and culmen lengths fall within the known (albeit rather narrow) ranges for Persian Shearwater published by Louette & Herremans (1985), whereas the tarsus is shorter (Table 1). From images of both the live bird and specimen, the absence of pectoral patches again eliminates Tropical Shearwater, whilst the limited white on the underwing-coverts, all-brown axillaries, indistinct pale spot in front of the eye and pinkish-blue legs, feet and webs with a black outer edge all strongly suggest the nominate subspecies of Persian Shearwater (Flood & Fisher 2020).

Sight records.—Two records of black-and-white shearwaters on the Kenya coast and a photographic record from northern Tanzania are detailed below.

1. *Puffinus persicus persicus*; 31 December 1972, 3.5 km off Watamu, near Malindi, Kenya. A bird observed just beyond the reef at Watamu, identified at the time as *P. lherminieri*, was detailed by Brown (1973) but can be confidently reidentified. The observer noted the bird as distinct from taxon *bailloni* (and by inference all other Tropical Shearwater taxa) by having dark underwing-coverts, as well as a 'white ring around the eye and a whitish streak on the side of the head'. *P. p. temptator* can be confidently eliminated by this latter feature (as in the December 1981 Mtwapa specimen), as the head of that subspecies lacks post-ocular white streaking. Taken together, these characters are typical of nominate *persicus*, and the record can be treated as the first documented Persian Shearwater in Kenya. The widely overlooked reference to this species' presence in Kenyan waters by Brown *et al.* (1982) may well relate to this sighting.



Figure 3. Persian Shearwater *Puffinus persicus persicus*, Diani, coastal Kenya, 26 February 2019, before it died (© S. Kapila)

2. *Puffinus persicus*; 14 March 2009 onshore at Emayani Beach Lodge, near Pangani, north-east Tanzania: plumage (flight feathers and tail) heavily worn but some body feathers (axillaries) fresh (Fig. 4). A beached bird 9 km south of Pangani, which was released alive, can be confidently referred to this species (Fig. 4) by the distinctive dusky underwings and axillaries, eliminating Tropical Shearwater. Additionally, dark undertail-coverts, an indistinct whitish spot in front of the eye, and rather brownish-black upperparts also support identification as Persian Shearwater. The absence of brown flank streaks or pale streaking behind the eye, albeit consistent with some nominate *persicus*, does not permit elimination of *temptator*, and therefore we leave this individual unassigned to subspecies.

This heavily worn individual had a slightly different underwing pattern compared to the freshly moulted bird at Diani, Kenya, in February 2019 (Fig. 3). Whilst the latter individual may have been an adult that had completed its annual moult of the flight feathers, it is possible the Pangani bird was a hatch-year individual from late in the season (e.g., hatched in August vs. May) yet to replace its first flight feathers. However, there is much variation in underwing markings in this taxon (Flood & Fisher 2020) and this aspect requires further study.



Figure 4. Persian Shearwater *Puffinus persicus*, ashore near Pangani, north-east Tanzania, 14 March 2009, showing the characteristic dusky underwing, axillaries, and faint white spot in front of the eye (© B. Simonsen)



Figure 5. Persian Shearwater *Puffinus persicus persicus*, off Watamu, coastal Kenya, 1 March 2022, showing the characteristic brown-toned upperparts, much-reduced white in the underwing-coverts, dusky axillaries and brown flanks streaking of this taxon (Jaap Gijbbersen)

TABLE 2
Sight records of small black-and-white shearwaters in Kenya additional to those confirmed records in Table 1 and detailed in the text, separated by period of occurrence and presumed identity. EABR = East African Bird Report.

Date	No. of birds	Location	Observer	Reference
Records from December to February presumed here to represent Persian Shearwater <i>Puffinus p. persicus</i>				
06/01/1973	1	Watamu (offshore)	unknown	D. A. Turner (<i>in litt.</i> 2022)
16/12/1973	5+	Kilifi (offshore)	G. R. C. van Someren	van Someren (1974)
22/12/1973	5+	Kilifi (offshore)	G. R. C. van Someren	van Someren (1974)
29/01/1977	1	Shimoni (offshore)	P. Britton	EABR 1977 (Anon. 1977)
12/02/1977	60	Kilifi (offshore)	P. Britton	EABR 1977 (Anon. 1977)
23/01/1981	1	Malindi (offshore)	N. Hartley	eBird (2022)
31/01/1981	1	Malindi (offshore)	L. Didham, P. Britton	EABR 1981 (Anon. 1981)
30/12/1982	4	Watamu (offshore)	D. A. Turner	EABR 1982 (Anon. 1982)
29/12/1983	3	Watamu (offshore)	D. A. Turner	EABR 1983 (Anon. 1983)
16/02/1985	1	Shimoni (offshore)	P. Hemphill	EABR 1985 (Anon. 1985)
24/12/1990	5	Kilifi (offshore)	T. Stevenson	EABR 1990 (Anon. 1990)
06/01/1991	1	Kilifi (offshore)	T. Stevenson	EABR 1990 (Anon. 1990)
16/12/1991	1	Mtwapa (offshore)	I. Parker	Parker (1992)
11/12/1994	1	Malindi (offshore)	L. Lens	Pearson & Turner (1998)
01/01/1998	1	Watamu (offshore)	T. Butynski	Jackson (1999)
31/12/2014	4	Watamu (offshore)	S. Ball	KenyaBirdsnet forum
Records from May to October assessed here as unidentified				
18/06/1983	100	Ras Ngomeni	M. Coverdale, D. J. Pearson	EABR 1983 (Anon. 1983)
13/08/1990	1	Shimoni (offshore)	P. Hemphill	EABR 1990 (Anon. 1990)
29/05/1991	2	Mombasa (offshore)	I. Sinclair	Shirihai <i>et al.</i> (1995)
20/10/1999	1	Watamu (offshore)	M. Mallalieu	Jackson (2000)

3. *Puffinus persicus persicus*; 1 March 2022, 12 km off Watamu, near Malindi, Kenya (Fig. 5). Photographs at sea taken by JG show a black-and-white shearwater with distinctly brownish-tinged upperparts, very little white on the underwing-coverts, dusky-brown axillaries, and heavy brownish flank streaks (Fig. 5). In the Indian Ocean, only nominate *persicus* has this combination of characters, and we refer the bird to that taxon. The absence of white markings on the head such as in the December individual of *P. p. persicus* from Mtwapa (see above), would appear to be normal in freshly moulted birds (e.g., the February 2019 Diani specimen), as would be expected for an adult in March immediately prior to the breeding season.

Unassigned records of black-and-white shearwaters.—In addition to the seven records detailed above, we located another 20 records of black-and-white shearwaters from Kenya (none from Tanzania), referred either to Audubon’s or Tropical Shearwaters but not accompanied by any details (Table 2). Of these, 16 (80%) are in December–February from near-shore waters between 03°S and 05°S. Based on our findings above, it is possible that most, if not all of these records, relate to Persian Shearwater *P. p. persicus*.

The remaining four reports of black-and-white shearwaters in Kenyan waters (Table 2) fall outside the December–March period. In the absence of documentation these birds cannot be assigned, although two merit further mention. The first is a puzzling observation of >100 birds just off Ras Ngomeni on 18 June 1983 (Anon. 1983), the highest count in Kenya, but at a time when nominate *persicus* would be expected to be breeding in Arabia (Porter *et al.* 1996). The identity of these birds is unresolved. The second observation concerns two birds 50 km off Mombasa on 29 May 1991 (Shirihai *et al.* 1995), which were referred to the taxon *atrodorsalis* (see Conclusions), now regarded as a synonym of *P. bailloni bailloni* (Bretagnolle *et al.* 2000).

Discussion

We demonstrate that Persian Shearwater does occur in Kenya, and may be the most frequently occurring small shearwater there, supporting the observation of Brown (1973) and subsequent account in Brown *et al.* (1982). This extends the widely accepted range of the species in the western Indian Ocean south from northern Somalia (Ash & Miskell 1982) by approximately 2,000 km to the Diani region of southern Kenya. It should be noted, however, that recent observations from the west coast of India and Sri Lanka have established that Persian Shearwater also regularly occurs as far south as 06°N in the central Indian Ocean (see Flood & Fisher 2020). Ash & Miskell (1982, 1998) tentatively referred birds off Mogadishu in November to *bailloni* or *nicolae*. However, given that non-breeding *persicus* appear off Kenya in December (specifically from mid December), they must surely move through Somali waters en route from their Arabian breeding grounds. Therefore, it is possible that November records on the central Somali coast also refer to nominate *persicus*.

That the presence of Persian Shearwater in Kenyan waters from December to February (with a few into March) appears to be annual suggests this section of the East African coast comprises a defined non-breeding ground for some of the population. During this period, they appear to concentrate c.3–10 km offshore between Mombasa and Watamu, with records north of there (e.g., at Malindi) slightly further offshore (up to 25 km). South of Mombasa, records are fewer and typically in February–March vs. December–January, indicating that some continue south along the coast as far as Pangani, northern Tanzania, before presumably returning north to Arabia to breed post-March.

Seasonal presence in coastal Kenya has been suggested by D. A. Turner (*in litt.* 2022) to be related to the annual upwelling of cold water on the North Kenya Banks between December and February associated with the north-east monsoon (Jacobs *et al.* 2020). This hypothesis is well supported by Bailey (1971), who noted that *persicus* is closely associated with upwelling seas on the north Somali coast, and the fewer records from that region during the boreal winter coincided with a cessation of upwelling there.

Our biometric data for the three *persicus* specimens complement those published by Louette & Herremans (1985). Data for all three specimens are largely at the minimum end of, or below, previous wing, tail, culmen and tarsus measurements for *persicus*. However, with the incorporation of our data, the overall range in measurements for these characters does not vary to any greater degree than in other regional *Puffinus* taxa. For example, *nicolae* in the Seychelles have tarsi of 35.5–39.5 mm (range 4.0 mm; Louette & Herremans 1985), while in *persicus* the range is 35.5–40.0 mm (4.5 mm; Louette & Herremans 1985 and this study). Similarly, in *nicolae* the culmen is 25.5–29.0 mm (3.5 mm; Louette & Herremans 1985) and in *persicus* it is 29.7–33.0 mm (3.3 mm; Louette & Herremans 1985 and this study). Likewise, the relatively short wing of the Msambweni specimen in concert with the data in Louette & Herremans (1985) results in a comparatively large range of 185–213 mm for this taxon, which is also true of our tail measurements, which extend the known range from

69.5–74.0 mm (Louette & Herremans 1985) to 60–74 mm. While this may simply reflect variation in this taxon's physical appearance (JB pers. obs. based on Macaulay Library images) it may also be the result of differences in methodology between authors. In the case of larger metrics, such as wing and tail, measuring bias is likely to be most extreme, which may also partly explain differences between our values and those in the prior literature. Our data do suggest, however, that while *persicus* has a relatively long culmen and short tail, wing and tarsus lengths may overlap with measurements of other regional *Puffinus* species.

Conclusions

That Persian Shearwater has been overlooked in Kenya waters for at least 50 years is understandable for two main reasons. Firstly, knowledge of shearwater taxonomy has only recently permitted clear delineation of two species among the five taxa in the Indian Ocean (Austin *et al.* 2004) previously lumped under *P. lherminieri*. Secondly, prior to our study, the only specimen material from Kenya was thought to be the Limuru bird, referred to Tropical Shearwater (nominate *bailloni*) due to a perceived lack of other likely options. In the absence of any post-1964 (when accessioned at AMNH) re-examination of the Limuru specimen, this ultimately led to the presumption that most if not all birds in Kenya were the same taxon (Lewis & Pomeroy 1989, Zimmerman *et al.* 1996, Stevenson & Fanshawe 2020).

Based on our findings, however, Tropical Shearwater is probably only a vagrant to Kenya, and we can discount *bailloni sensu stricto* as having occurred at all (with any degree of certainty). Instead, we advocate admission of subspecies *nicolae* to the national list based on our re-examination of the specimen from Limuru in October 1963. Whilst *nicolae* and *bailloni* are currently considered conspecific, some authorities have suggested that they warrant specific treatment (Austin *et al.* 2004, Howell & Zufelt 2019), making resolution of the specimen's identification all the more important.

A putative record of two *P. bailloni* seen 50 km off Mombasa in May 1991 (Shirihai *et al.* 1995), far from the inshore waters used by *P. persicus*, were reported as taxon *atrodorsalis* (then considered a valid subspecies of Tropical Shearwater). However, in the absence of details for this report, it seems premature to treat this as a second confirmed Kenya record of Tropical Shearwater. Furthermore, whilst three additional records from June–October might also pertain to Tropical Shearwater, there is insufficient evidence to claim as much at present. N. Baker (*in litt.* 2022) has confirmed that Tropical Shearwater is unrecorded in Tanzanian waters, further suggesting that the species is no more than a vagrant to East Africa.

Acknowledgements

We are most grateful to Paul Sweet and Augie Kramer at the American Museum of Natural History, and to Peter Njoroge and Titus Imboma at the National Museums of Kenya, for facilitating access to specimen material and for providing photographs and measurements. We also thank Neil Baker for information from Tanzania, and Shiv Kapila and Sophie Simonsen for photographs of birds in coastal Kenya and Tanzania respectively. We are indebted to Don Turner for details of the Limuru specimen, for directing us to pertinent literature and records, and for additional comments and suggestions. Lastly, we thank Bob Flood and Vincent Bretagnolle for helpful reviews of the paper, and Guy Kirwan for further suggestions.

References:

- Anon. 1977. East African Bird Report 1977. *Scopus* 1: 114–131.
- Anon. 1981. East African Bird Report 1981. *Scopus* 5: 129–153.
- Anon. 1982. East African Bird Report 1982. *Scopus* 6: 109–143.
- Anon. 1983. East African Bird Report 1983. *Scopus* 7: 104–135.
- Anon. 1985. East African Bird Report 1985. *Scopus* 9: 145–171.
- Anon. 1990. East African Bird Report 1990. *Scopus* 14: 129–157.

- Ash, J. S. & Miskell, J. E. 1982. Birds of Somalia, their habitat, status and distribution. *Scopus Spec. Suppl.* 1: 1–97.
- Ash, J. S. & Miskell, J. E. 1998. *Birds of Somalia*. Pica Press, Robertsbridge.
- Austin, J. J., Bretagnolle, V. & Pasquet, E. 2004. A global molecular phylogeny of the small *Puffinus* shearwaters and implications for systematics of the Little-Audubon's Shearwater complex. *Auk* 121: 847–864.
- Bailey, R. S. 1971. Seabird observations off Somalia. *Ibis* 113: 29–41.
- Bretagnolle, V., Attié, C. & Mougeot, F. 2000. Audubon's Shearwaters *Puffinus lherminieri* on Réunion Island, Indian Ocean: behaviour, census, distribution, biometrics and breeding biology. *Ibis* 142: 339–412.
- Britton, P. L. (ed.) 1980. *Birds of East Africa*. East Africa Natural History Society, Nairobi.
- Brown, L. H. 1973. Unusual seabirds off Watamu, Kenya. *E. Afr. Nat. Hist. Soc. Bull.* 1973: 39–40.
- Brown, L. H., Urban, E. K. & Newman, K. 1982. *The birds of Africa*, vol. 1. Academic Press, London.
- eBird. 2022. eBird: an online database of bird distribution and abundance. Cornell Lab of Ornithology, Ithaca, NY. <http://www.ebird.org> (accessed 20 May 2022).
- Flood, R. L. & Fisher, A. 2020. *Multi media identification guide to North Atlantic seabirds: shearwaters: Jouanin's & White-chinned Petrels*. Pelagic Birds & Birding Multimedia Identification Guides, Scilly.
- Flood, R. L. & van der Vliet, R. 2019. Variation in the plumage aspect of Barolo and Boyd's Shearwaters. *Dutch Birding* 41: 215–237.
- Gill, F., Donsker, D. & Rasmussen, P. (eds.) 2021. IOC world bird list (v11.1). doi:10.14344/IOC.ML.11.1 (accessed 20 May 2022).
- Harrison, P. 1983. *Seabirds: an identification guide*. Croom Helm, Beckenham.
- Howell, S. N. G. & Zufelt, K. 2019. *Oceanic birds of the world*. Princeton Univ. Press.
- Jackson, C. J. 1999. Records. *Kenya Birds* 7: 33–48.
- Jackson, C. J. 2000. Records. *Kenya Birds* 8: 44–67.
- Jacobs, Z. L., Jebri, F., Raitos, D. E., Popova, E., Srokosz, M., Painter, S. C., Nencioli, F., Roberts, M., Kamau, J., Palmer, M. & Wihsgott, J. 2020. Shelf-break upwelling and productivity over the North Kenya Banks: the importance of large-scale ocean dynamics. *JGR Oceans* 125(1): e2019JC015519.
- Lewis, A. & Pomeroy, D. 1989. *Bird atlas of Kenya*. A. A. Balkema, Rotterdam.
- Louette, M. & Herremans, M. 1985. A new race of the Audubon's Shearwater *Puffinus lherminieri* breeding at Moheli, Comoro Islands. *Bull. Brit. Orn. Cl.* 105: 42–49.
- Mann, C. F. 1976. Some recent changes in our knowledge of bird distribution in East Africa. *J. E. Afr. Nat. Hist. Soc. & Natl. Mus.* 157: 3.
- Onley, D. & Scofield, P. 2007. *Albatrosses, petrels and shearwaters of the world*. Christopher Helm, London.
- Parker, I. 1992. A third Kenya record of Jouanin's Petrel. *Scopus* 16: 54–55.
- Pearson, D. J. & Turner, D. A. 1998. Review of Kenya bird records 1992–1996. *Scopus* 20: 65–83.
- Penny, M. 1986. *Birds of the Seychelles and the outlying islands*. Collins, London.
- Porter, R. F., Christensen, S. & Schiermacker-Hansen, P. 1996. *Field guide to the birds of the Middle East*. Academic Press, London.
- Shirihai, H. & Bretagnolle, V. 2015. The poorly known Mohéli Shearwater *Puffinus (persicus) temptator* at the Comoro Islands, western Indian Ocean. *Bull. Brit. Orn. Cl.* 135: 216–223.
- Shirihai, H. & Christie, D. A. 1996. A new taxon of small shearwater from the Indian Ocean. *Bull. Brit. Orn. Cl.* 116: 180–186.
- Shirihai, H., Sinclair, I. & Colston, P. R. 1995. A new species of *Puffinus* shearwater from the western Indian Ocean. *Bull. Brit. Orn. Cl.* 115: 75–84.
- van Someren, G. R. C. 1974. At sea off Watamu. *E. Afr. Nat. Hist. Soc. Bull.* 1974: 19–20.
- Stevenson, T. & Fanshawe, J. H. 2020. *Birds of East Africa: Kenya, Tanzania, Uganda, Rwanda and Burundi*. Second edn. Christopher Helm, London.
- Zimmerman, D. A., Turner, D. A. & Pearson, D. J. 1996. *Birds of Kenya and northern Tanzania*. Christopher Helm, London.
- Addresses:* James Bradley, 7961 East Saanich Road, Saanichton, BC, Canada, V8M 1T4, e-mail: james_bradley@ymail.com. Sidney Shema, P.O. Box 5453-00100, Nairobi, Kenya, e-mail: sidneyshema@gmail.com. Jaap Gijsbertsen, Bosweg 25, 3922GK, Elst (Utrecht), the Netherlands, e-mail: jaap.gijsbertsen@arocha.org