PRESUMED FUEGIAN STORM PETRELS *OCEANITES OCEANICUS CHILENSIS* OFF SÃO TOMÉ, GULF OF GUINEA, AND IN THE NORTH AND SOUTH ATLANTIC OCEANS

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ABSTRACT

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This note summarises key identification criteria for Fuegian Storm Petrel *Oceanites oceanicus chilensis* that permit field separation from Wilson's Storm Petrel *O. o. oceanicus/exasperatus*. Multiple sightings of presumed Fuegian Storm Petrel off São Tomé are considered in the light of these identification criteria. Here, we establish a provisional range for presumed Fuegian Storm Petrels in the Atlantic based on relevant literature, photographs in the Macaulay Library, and responses to social media requests.

Key words: Wilson's Storm Petrel, Fuegian Storm Petrel, storm petrel range, storm petrel identification

INTRODUCTION

In June 2023 we visited São Tomé, an island in the Gulf of Guinea, equatorial eastern North Atlantic Ocean, where we conducted research toward better understanding the undescribed local form of Band-rumped Storm Petrel *Hydrobates castro*. Our effort included four boat trips to waters 10-16 km offshore, east of São Tomé Town. Fish oil and fish offal were used to attract storm petrels to the boat for close observation and photography. In addition to numerous Band-rumped Storm Petrels, 10 *Oceanites* storm petrels were attracted to the boat. The photographs revealed that all of them exhibited characteristics of Fuegian Storm Petrel *Oceanites oceanicus chilensis*. This is a significant observation, since Fuegian Storm Petrel is known to breed only in southern to central Chile (eastern South Pacific Ocean, December–March; Murphy 1936), from which it moves northward to Peru (Howell & Zufelt 2019). It may also breed in the Falkland Islands (western South Atlantic Ocean; Murphy 1936), from which it may range to waters off southwestern Africa, but rarely to the North Atlantic Ocean (Howell & Zufelt 2019). This note summarises characteristics of Fuegian Storm Petrel, based on our extensive studies off Chile. We show that the storm petrels off São Tomé exhibit the same characteristics as Chilean Fuegian Storm Petrels, and we also report findings from our subsequent search for evidence of similar-looking storm petrels elsewhere in the North and South Atlantic oceans.

Recognition of Fuegian Storm Petrel

Two taxa of Wilson's Storm Petrel are widely recognised: (1) Fuegian Storm Petrel *O. o. chilensis*, which breeds along the coast of Chile and possibly east to the Falkland Islands; and (2) the more widespread Wilson's Storm Petrel *O. o. oceanicus*, which breeds on sub-Antarctic islands and along the Antarctic coastline (December–March/April), before migrating to the northern hemisphere in the Atlantic, Indian, and Pacific oceans. Antarctic breeders (i.e., those nesting south of the Antarctic Polar Front) are larger on average than sub-Antarctic ones. Size variation may be clinal, but some authorities treat the Antarctic storm petrels as the taxon *O. o. exasperatus*, with the smaller sub-Antarctic storm petrels being the nominate form (Flood & Fisher 2013). On average, Fuegian Storm Petrel is the smallest of the species assemblage and recent research indicates that it comprises two taxa (A. Jaramillo *in litt*. 2023). Thus, the Wilson's Storm Petrel complex may comprise four taxa. A population of *Oceanites* storm petrels found in waters around Chiloe Island in central Chile, within the geographical range of the similar-sized Fuegian Storm Petrel, has been described as Pincoya Storm Petrel *O. pincoyae* (Harrison *et al.* 2013).

Common structural characteristics within this species complex include a relatively short inner wing, a moderately angular leading edge to the wing, a straight trailing edge to the wing, pointed wing tips, long legs, and a long caudal projection, including toe

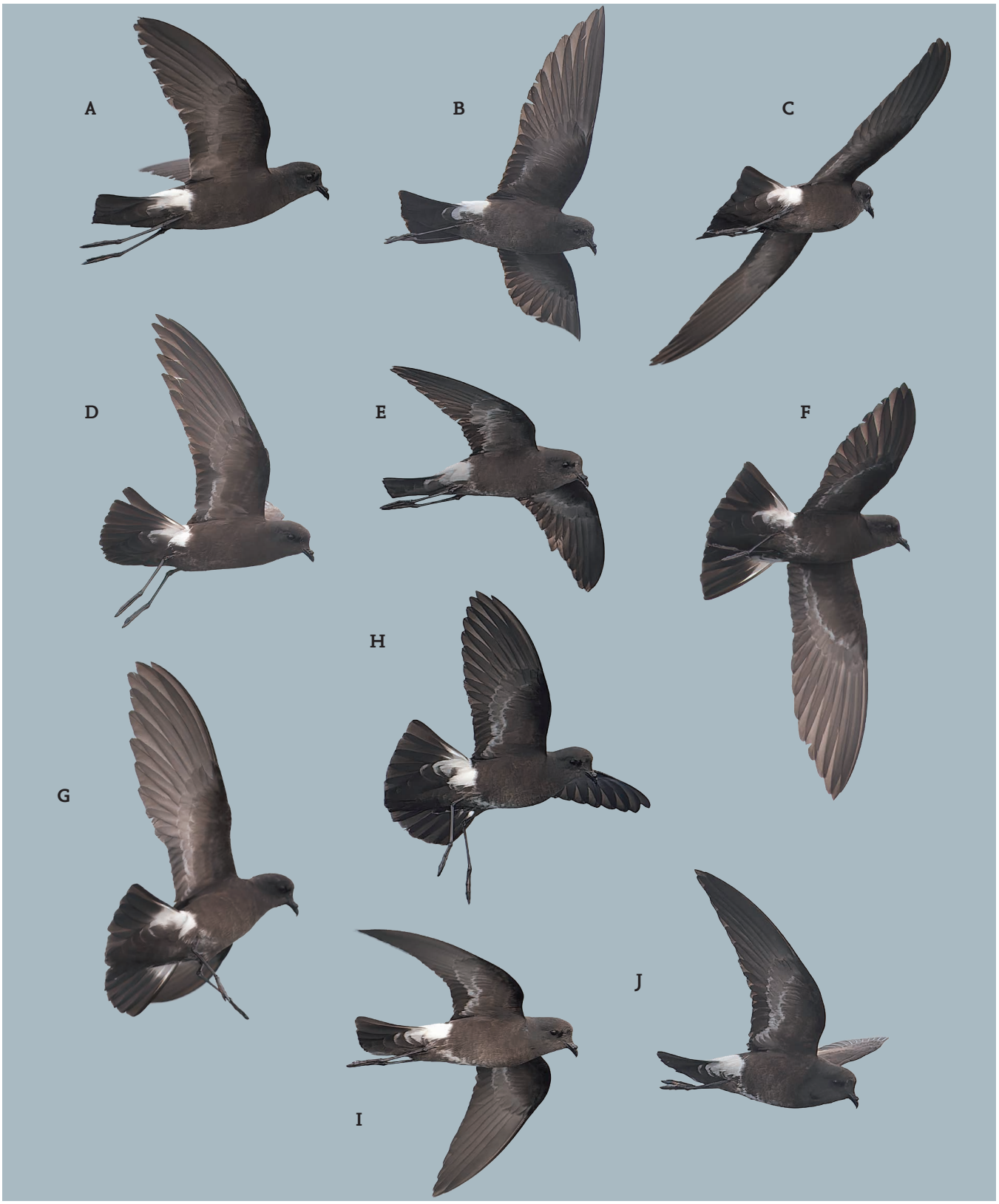

Fig. 1. Known Fuegian Storm Petrels *Oceanites oceanicus chilensis* observed in the Humboldt Current off Chile, 32°00′S–30°50′S, 073°30′W–075°00′W, 07–10 March 2020. Photos show variation in the white tips to the median and greater primary and secondary underwing-coverts and the white in the belly feathers, and subjects are arranged approximately from least marked to most marked (top left to bottom right). A: The bird resembles Wilson's Storm Petrel *O. o. oceanicus/exasperatus* but on scrutiny, the barest remnants of white tips can be seen on the greater secondary coverts. B: Remnants of white tips to the greater secondary coverts are evident and on scrutiny, the barest amount of white can be seen in the belly feathers. C–H: The amount of white to the tips of median and greater primary and secondary coverts and in the belly feathers steadily increases. I–J: White tips to the median and greater primary and secondary coverts and white in the belly feathers are clear in the images and, with reasonable views, at sea. Note the compact body structure. This figure was generated from photos taken by Kirk Zufelt.

Fig. 2. Presumed Fuegian Storm Petrels *Oceanites oceanicus chilensis* observed off São Tomé, Gulf of Guinea, 22–25 June 2023. Photos show variation in the white tips to the median and greater primary and secondary underwing-coverts and the white in the belly feathers, and subjects are arranged approximately from least marked to most marked (top left to bottom right). The underwing-covert and belly feather markings and their variation in the 10 São Tomé storm petrels bear a striking resemblance to the Fuegian Storm Petrels in Fig. 1. This figure was generated from photos taken by Kirk Zufelt.

projection beyond the tail end (Flood & Fisher 2013, Howell & Zufelt 2019). Fuegian and Pincoya storm petrels represent a small, compact version of the typical Wilson's Storm Petrel, though there are also examples of small, compact Wilson's Storm Petrels.

Common plumage and bare parts of species in this complex are characterised by a brownish-black coat of feathers; a pale upperwing-covert bar across the inner wing; a white 'rump patch' across the uppertail-coverts, folding over to the underside where it joins the white thigh patches; and yellow webbings in the feet (Flood & Fisher 2013, Howell & Zufelt 2019). In addition, Fuegian Storm Petrel typically has variable white tips to the median and greater primary and secondary underwing-coverts and variable white in the belly feathers; the latter are hard to see in live birds flying over sea, and the belly is often obscured in photos (Flood & Fisher 2013, Howell & Zufelt 2019). We have found that Wilson's Storm Petrel scarcely shows white in the underwing-coverts, and rarely in the belly feathers (e.g., as evidenced in the western South Pacific Ocean, where Fuegian Storm Petrel is unlikely to occur). Fig. 1 illustrates the variation in Fuegian Storm Petrels encountered off Chile. Note that white tips and fringes wear away as feathers age. Fuegian Storm Petrels having minimal white in the underwing-coverts and belly feathers are like typical Wilson's Storm Petrels (compare Figs. 1 and 3), while those with maximal white are similar to the least marked Pincoya Storm Petrels (compare Figs. 1 and 4; Howell & Schmitt 2016).

Fig. 3. Wilson's Storm Petrel *Oceanites oceanicus oceanicus/exasperatus* observed in the Gulf Stream off Hatteras, North Carolina, USA, 22 May 2023. The least marked Fuegian Storm Petrels *O. o. chilensis* look virtually identical to a typical Wilson's Storm Petrel. Compare this to the storm petrels in the top left in Figs. 1 and 2. Photo credit: Kirk Zufelt

In summary, most Fuegian Storm Petrels are a small, compact version of Wilson's Storm Petrel, characterised by variable white tips to the median and greater primary and secondary underwing-coverts and white in the belly feathers. These characteristics are rarely found in Wilson's Storm Petrel. The descriptions above are based on observations made during the field studies listed in Appendix 1 (available online).

Presumed Fuegian Storm Petrels in waters off São Tomé

The 10 *Oceanites* storm petrels photographed in waters off São Tomé were too small for all but a minority of Wilson's Storm Petrels. Judgement was partly based on size comparison with a European Storm Petrel *Hydrobates pelagicus*. We have decades of experience of observing European and Wilson's storm petrels side by side off the Isles of Scilly, England. The 10 storm petrels had the compact structure of Fuegian Storm Petrel, though one individual that was well-marked in the underwings and belly had a slightly elongate neck and body. Fig. 2 shows variation in white tips to the median and greater primary and secondary underwing-coverts and white in the belly feathers. Notwithstanding effects of moult and wear, the plumage characteristics of the storm petrels from Chile and São Tomé are strikingly similar (compare Figs. 1 and 2). Progress in primary moult, along with wear and bleaching to the plumage of the 10 storm petrels, is summarised in Table 1. Wide variation in the progress of primary moult is an indication of multiple age groups or a protracted

Fig. 4. Pincoya Storm Petrels *Oceanites pincoyae* observed in the Gulf of Ancud, Chile, 24 February 2020. White in the underwing-coverts and belly feathers of the least heavily marked Pincoya Storm Petrel (left) are similar to the most heavily marked Fuegian Storm Petrel *O. oceanicus chilensis* (bottom rows of Figs. 1 and 2). No other taxon of *Oceanites* is as heavily marked as a typical Pincoya Storm Petrel (right). Photo credit: Kirk Zufelt

TABLE 1
Assessment of progress in primary moult and of the wear and bleaching of plumage in 10 presumed Fuegian Storm Petrels *Oceanites oceanicus chilensis* off São Tomé[a]

Progress in primary moult	Wear and bleaching of plumage
Not in primary moult	The single photograph suggests light wear.
Not in primary moult	Lightly worn and slightly bleached.
P1-p4 new, p5 growing, p6 dropped, p7-p10 old	About half of plumage replaced. Old plumage fairly worn and bleached. Old primary tips lightly worn.
P1-p5 new, p6 growing, p7 dropped, p8-p10 old	About half of plumage replaced. Old plumage fairly worn and bleached. Old primary tips lightly worn.
P1-p5 new, p6 growing, p7 dropped, p8-p10 old	About half of plumage replaced. Old plumage fairly worn and bleached. Old primary tips lightly worn/broken.
P1-p6 new, p7 growing, p8 dropped, p9-p10 old	About half of plumage replaced. Old plumage fairly worn and bleached. Old primary tips lightly worn.
P1-p7 new, p8 growing, p9-p10 old	Majority of plumage new. Old primary tips heavily worn. Presume p9 about to drop.
P1-p8 new, p9 65% grown, p10 30% grown	Majority of plumage new.
P1-p8 new, p9 85% grown, p10 35% grown	Majority of plumage new.
P1-p8 new, p9 85% grown, p10 40% grown	Majority of plumage new.

[a] Ordered top to bottom by progress in primary moult, evaluated from photographs taken 22–25 June 2023

breeding season. Numerous presumed Fuegian Storm Petrels were photographed on 02 April 2012 (Fig. 5) south of Liberia, 1700 km due west of São Tomé, at 00°48′S, 008°41′W, an area linked to the Gulf of Guinea by the Guinean Current.

In short, the combination of small size, compact structure, and variable white tips to the median and greater primary and secondary underwing-coverts and white in the belly feathers points to Fuegian Storm Petrel. Rare variation in Wilson's Storm Petrel cannot explain away such plumage characteristics in all 10 storm petrels. This raises the question: where else in the Atlantic do such storm petrels occur?

Presumed Fuegian Storm Petrels in the Atlantic

We looked for evidence of Fuegian Storm Petrels elsewhere in the Atlantic by searching the literature, posting a request on social media, and examining photographs in the Macaulay Library at the Cornell Lab of Ornithology. Study results for latter are shown in Table 2 for the eastern Atlantic and Table 3 for the western Atlantic. We looked for Wilson's Storm Petrels *sensu lato* showing the plumage characteristics presented in Fig. 1. Only photographs that clearly revealed the storm petrel's underwing and underbody characteristics were included in the study.

Fig. 5. Presumed Fuegian Storm Petrels *Oceanites oceanicus chilensis* observed south of Liberia, 1700 km west of the Gulf of Guinea, in the Guinea Current, on 02 April 2012. The compact build, thick white tips to the median and greater primary and secondary underwing-coverts, and white in the belly feathers of one storm petrel, make it unlikely that these are Wilson's Storm Petrels *O. o. oceanicus/exasperatus*. These birds are well within the Fuegian Storm Petrel range of variation, given the season-related wear to feathers and photograph exposure. Rarely would Pincoya Storm Petrels *O. pincoyae* be this lightly marked (see Fig. 4). In the Gulf of Ancud, Chile, less than 1% of the 2000–3000 Pincoya Storm Petrels observed and photographed were as lightly marked as these birds. Photo credit: Gorka Ocio

TABLE 2
Eastern North and South Atlantic occurrence of Wilson's Storm Petrels *Oceanites oceanicus* showing characteristics of Fuegian Storm Petrel *O. o. chilensis* using photographs in the Macaulay Library (last search conducted on 18 October 2023)[a]

Region	Months	No. photos	No. underside	Fuegian characteristics		
				Underwing	Belly	%
Northwestern Europe	07–08	202	26	1	0/0	4
Southwestern Europe	04–12	1080	212	6	0/4	3
Southern Africa	02, 04, 06, 07, 09–12	155	38	17	3/7	45

[a] Southwestern Europe incorporates the Macaronesian Islands. Months = month of year in which Wilson's Storm Petrels were photographed, represented numerically (01 is January, 02 is February, etc.). No. photos = the total number of photographs of Wilson's Storm Petrels found in the Macaulay Library. No. underside = the number of Wilson's Storm Petrels that show the underside clearly enough to evaluate characteristics. Fuegian characteristics = characteristics of Fuegian Storm Petrel shown in Fig. 1; Underwing = the number of storm petrels that showed underwing characteristics; Belly = the number of storm petrels that showed belly characteristics and where the belly itself clearly visible; % = the percentage of storm petrels that showed characteristics of Fuegian Storm Petrel.

TABLE 3
Western North and South Atlantic occurrence of Wilson's Storm Petrels *Oceanites oceanicus* showing characteristics of Fuegian Storm Petrel *O. o. chilensis* using photographs in the Macaulay Library (last search conducted on 18 October 2023)[a]

Region	Months	No. photos	No. underside	Fuegian characteristics		
				Underwing	Belly	%
Canada	06–10	749	70	6	2/4	9
USA	04–09	7127	842	31	0/11	4
Brazil	05, 07, 09, 10, 12	36	12	4	0/0	33
Argentina	01–04, 06–12	90	19	9	3/4	47
Falklands	01–02, 11–12	52	7	4	0/0	57
Drake Passage	01–03, 11–12	31	7	3	0/2	43
South Georgia	01–04, 11–12	142	29	0	0/0	0
Antarctica	01–03, 10–12	409	101	2	0/2	2

[a] Drake Passage includes Beagle Channel. Photographs for central America and the Caribbean were few. Months = month of year in which Wilson's Storm Petrels were photographed, represented numerically (01 is January, 02 is February, etc.). No. photos = the total number of photographs of Wilson's Storm Petrels found in the Macaulay Library. No. underside = the number of Wilson's Storm Petrels that show the underside clearly enough to evaluate characteristics. Fuegian characteristics = characteristics of Fuegian Storm Petrel shown in Fig. 1; Underwing = the number of storm petrels that showed underwing characteristics; Belly = the number of storm petrels that showed belly characteristics and where the belly itself clearly visible; % = the percentage of storm petrels that showed characteristics of Fuegian Storm Petrel.

Eastern North and South Atlantic

We found another hotspot for presumed Fuegian Storm Petrels. A search of the Macaulay Library found that 17 of 38 (45%) Wilson's Storm Petrels photographed during pelagic trips off South Africa, from Cape Town in the west (eastern South Atlantic) to St. Lucia in the east (southwestern Indian Ocean), showed characteristics of Fuegian Storm Petrel. Examples of presumed Fuegian Storm Petrel were found for February, April, June, July, and September–December. About 25% of Wilson's Storm Petrels off Cape Town showed variable white tips to the underwing-coverts, fewer with white in the belly feathers, and they are present year-round (T. Hardaker *in litt*. 2023). Of note, a presumed Pincoya Storm Petrel was photographed off South Africa in May 2021 (Jamie & Keogh 2024).

Few examples of presumed Fuegian Storm Petrel were found among a large sample of Wilson's Storm Petrels in waters off northwestern Africa: individual birds were photographed off Senegal in June (Fig. 6) and off Gabon in August. For southwestern Europe and the Macaronesian Islands, the result was 6 of 212 (3%) Wilson's Storm Petrels. For northwestern Europe, the result was 1 of 26 (4%) Wilson's Storm Petrels. Of about 1000 Wilson's Storm Petrels recorded off the Isles of Scilly over the last two decades, only two had underwing-coverts with white tips, one of which also had a little white in the belly feathers (both sightings recorded in August; Flood 2011).

Western North and South Atlantic

For the coastal Antarctic continent, 2 of 101 (2%) Wilson's Storm Petrels showed some white tips to the underwing-coverts, though not in the belly feathers. Flood (2011) included a photograph of a presumed Fuegian Storm Petrel in waters off South Georgia, though none were found for those waters among 29 Wilson's Storm Petrels in the Macaulay Library.

Fig. 6. Presumed Fuegian Storm Petrel *Oceanites oceanicus chilensis* observed off Senegal, 04 June 2016. See caption to Fig. 5. Photo credit: Gorka Ocio

In Drake Passage and Beagle Channel, 3 of 7 (43%) Wilson's Storm Petrels showed characteristics of Fuegian Storm Petrel. Of six skins of Wilson's Storm Petrels collected in the Falkland Islands and housed at the Natural History Museum at Tring, three clearly show the characteristics of Fuegian Storm Petrel (confirmed by RLF), as did 4 of 7 (57%) Wilson's Storm Petrels photographed off the Falkland Islands. Off Argentina, 9 of 19 (47%) Wilson's Storm Petrels exhibited characteristics of Fuegian Storm Petrel, as did 4 of 12 (33%) off Brazil.

The Macaulay Library collection includes a substantial number of photographs of Wilson's Storm Petrels for North America, reflecting regular pelagic birding and greater use of eBird. Most of them are Wilson's Storm Petrel *O. o. oceanicus/exasperatus*. Off the USA, just 31 of 842 (4%) Wilson's Storm Petrels showed characteristics of Fuegian Storm Petrel, while off Canada, 6 of 70 (9%) showed the characteristics, including two of four with white in the belly. Because the US sample size is much larger than the Canadian one, its percentages are more accurate.

DISCUSSION

Consistency in size, structure, and plumage of the 10 São Tomé storm petrels strongly suggests representatives of a single population, presumably Fuegian Storm Petrel, rather than a scarce/rare variation in Wilson's Storm Petrel. Scarce/rare variations would likely be widely scattered geographically, not locally concentrated. Variation in the 10 São Tomé storm petrels represents the full range of variation in Fuegian Storm Petrel off Chile. Progress in primary moult indicates either several age groups or a protracted breeding season. Concentrations of presumed Fuegian Storm Petrels off South Africa and São Tomé suggest a continuity in range off the west coast of Africa, up the Benguela and Angola currents to the Gulf of Guinea. Few such storm petrels were found in the Macaronesian Islands or further north off western Europe. In the western South Atlantic, not surprisingly, storm petrels showing characteristics of Fuegian Storm Petrel were found in concentrations off the Falklands and northwards up the Falkland and Brazilian currents to Brazil. Like the eastern South Atlantic, few such storm petrels were found north of the equator. Also, few representatives were photographed in waters off the coastal Antarctic continent and off South Georgia.

CONCLUSIONS

Oceanites storm petrels showing characteristics of Fuegian Storm Petrel occur northwards to the equatorial regions on both sides of the South Atlantic, but they are rarely sighted in the temperate zone of the North Atlantic or in the Southern Ocean to the Antarctic continent. The latitudes in which presumed Fuegian Storm Petrels regularly occur mirror those of the known range of Fuegian Storm Petrel off western South America. By contrast, Wilson's Storm Petrel is a long-distance migrant, from Antarctica and the sub-Antarctic Islands to the temperate zone of the North Atlantic, regularly to 50°N. *Oceanites* storm petrels showing characteristics of the Fuegian Storm Petrel are scarce to rare beyond the northern and southern latitudes of the known range of Fuegian Storm Petrel. These storm petrels could be stray Fuegian Storm Petrels, but it is likely that most are examples of variation in Wilson's Storm Petrel. All that said, we do not exclude an unknown taxon or an unidentified breeding population of Fuegian Storm Petrel as an explanation for the presumed Fuegian Storm Petrels in the Atlantic, though we have found no evidence to support the idea. Thus, we hypothesise that the storm petrels originate from known Chilean breeding populations, the Falklands, or both. Further study is required. As a first step, the taxonomic status of the Falkland population and the presumed Fuegian Storm Petrels found in the Atlantic require clarification using molecular techniques.

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