

Occurrence of Leach's Storm-petrel *Hydrobates leucorhous* near the Saint Peter and Saint Paul Archipelago, Brazil

Lucas Penna Soares Santos^{1*}, Camila Brasilino Botêlho de Araújo^{2,3}, Marco Antonio Carvalho de Souza⁴, Jorge Eduardo Lins Oliveira⁵ and Danielle de Lima Viana³

* Correspondence author: penna.lucas@gmail.com

¹ Instituto Chico Mendes de Conservação da Biodiversidade, Centro Nacional de Pesquisa e Conservação de Aves Silvestres/Núcleo de Gestão Integrada de Fernando de Noronha, Fernando de Noronha, Pernambuco, Brazil;

² Programa de Pós-Graduação em Biologia Animal, Centro de Biociências, Departamento de Zoologia, Cidade Universitária, Recife, Pernambuco, Brazil;

³ Laboratório de Oceanografia Pesqueira, Universidade Federal Rural de Pernambuco, Recife, Pernambuco, Brazil;

⁴ Secretaria da Comissão Interministerial para os Recursos do Mar, Brasília, Brazil;

⁵ Laboratório de Biologia Pesqueira, Universidade Federal do Rio Grande do Norte, Natal, Rio Grande do Norte, Brazil.

Abstract

Storm-petrels demonstrate complex spatial dynamics, with some species moving among continents. We report a sighting of a Leach's Storm-petrel *Hydrobates leucorhous*, recorded on a scientific expedition near the Saint Peter and Saint Paul Archipelago (SPSPA), the smallest Brazilian oceanic islands. Our species identification was based on A) morphological characteristics (plumage pattern and pronounced forked tail), B) other records of this species surrounding the SPSPA, and C) tracking studies of the at-sea distribution of this species, especially that of North Atlantic populations that cross equatorial regions during their migration and non-breeding periods. This report comprises the second of two documented accounts of Leach's Storm-petrel in SPSPA waters. These records highlight knowledge gaps in the

spatial dynamics of seabird species, an increased understanding of which might provide novel insights into species biogeography.

Introduction

Procellariiformes have large-scale spatial dynamics and travel long distances on migration, including trans-equatorial movements (Phillips *et al.* 2005; González-Solís *et al.* 2007). Tracking and banding/ringing data have revealed non-breeding movements that range from North America to oceanic basins in the Southern Hemisphere, with several sites being used regularly during migratory periods, including by Leach's Storm-petrel *Hydrobates leucorhous* in the South Atlantic (Veit *et al.* 1996; Camphuysen 2007; Pollet *et al.* 2014, 2019). Knowledge of the migratory behaviour of oceanic birds can be

complimented by site-based records, providing refined geographic distribution information, especially in remote areas.

Storm-petrels (i.e., Hydrobatidae and Oceanitidae) are oceanic birds that are widely distributed across oceanic basins and offshore areas (Brooke 2004). Their small sizes and subtle differences in their external plumages can lead to difficulties in differentiating between species whilst they are at sea (Flood *et al.* 2019; Taylor *et al.* 2019).

Leach's Storm-petrel is a highly pelagic and migratory species that uses coastal areas and offshore islands to breed (Pollet *et al.* 2021). Several breeding colonies of Leach's Storm-petrel in the North Atlantic Ocean are declining (Pollet & Shutler 2018; d'Entremont *et al.* 2020; Deakin *et al.* 2021) and as a result, the species is currently listed as 'Vulnerable' on the IUCN Red List (IUCN 2018). In Brazil, this species is regarded as a non-breeding visitor (Pacheco *et al.* 2021).

Located on the Mid-Atlantic Ridge, the São Pedro e São Paulo Archipelago (SPSPA; 00°55'N 29°20'W) is a group of rocky islands c. 1,100 km east of the city of Natal, Brazil, and 520 km from the Fernando de Noronha Archipelago (3°52'S 32°25'W; Edwards & Lubbock 1983). This island group occupies an area of c. 1.7 ha, with a maximum elevation of 18 m above sea level (Motta *et al.* 2018). Historically, the area was explored for fishing (Viana *et al.* 2008, 2015) and more recently, it was listed as a Marine Protected Area under two categories: Natural Monument

(MONA; strict protection, 47,263 km²) and Environment Protection Area (APA; sustainable use, 384,501 km²). The SPSPA is considered an important breeding and feeding site for pelagic birds in the Central Equatorial Atlantic and it supports resident seabirds, such as a Brown Booby *Sula leucogaster* population (Barbosa Filho & Vooren 2010).

Here, we present a documentation of Leach's Storm-petrels around the SPSPA. We compile information from a shipboard observation as well as that from a review of the literature and citizen-science data platforms (namely eBird, iNaturalist and WikiAves). We therefore evaluated records from within 200 km of the SPSPA using specimens, photographs or video records.

Results and Discussion

On 24 September 2021, while travelling towards the SPSPA for fieldwork, the authors (DLV and MACS) recorded a storm-petrel resting on a vessel (location: 00°15'S, 29°46'W), c. 87 km from the SPSPA at 13.50 local time. The individual seemed exhausted, with slightly damp feathers (Figure 1). Photos were taken of the individual, but detailed observations of biometrics were not conducted. After approximately three hours resting onboard the vessel, the storm-petrel flew to sea. The bird's condition and resting behaviour on the vessel may suggest that it had experienced a lack of food for an extended period. Whilst the bird was on the vessel, the sky was clear/slightly cloudy, there was a southeast wind strength of 3–5 knots, southeast-east wave height of 1.0–1.5 m, good visibility, 30°C air temperature, and air pressure of 1,009 hPa.

To identify the bird by morphological differences, we first systematically ruled out other storm-petrel species that could possibly occur around the SPSPA, such as Wilson's Storm-petrel *Oceanites oceanicus*, Madeiran Storm-petrel *H. castro*, European Storm-petrel *H. pelagicus*, Monteiro's Storm-petrel *H. monteiroi*, and Cape Verde Storm-petrel *H. jabejabe*. Instead, the identification of the bird as a Leach's Storm-petrel was supported by its dark body pattern and lack of white colouring on its underwing and belly feathers, and a sharply bifurcated tail with the classic patterning of the white-rumped storm-petrels (Flood & Thomas 2007; Flood & Fisher 2013; score 3–4 as per Ainley 1980). Furthermore, the bird's legs lacked any yellowish colour, eliminating Wilson's Storm-petrel.

Other information supporting the identification of the bird as a Leach's Storm-petrel includes the proximity of other records from this species at similar latitudes to SPSPA (Bourne & Simmons 1997; Underhill *et al.* 2002). Furthermore, Leach's Storm-petrels breed from May to September/ October before migrating (Huntington *et al.* 1996), thereby coinciding with the timing our record. During October Leach's Storm-petrels migrate towards the tropics (Pollet *et al.* 2014) and a population has been observed to undertake a distinct migratory route that passes close to the SPSPA (Pollet *et al.* 2019).

Despite its known passage through the equatorial Atlantic Ocean, Leach's Storm-petrel has not previously been reported in studies of the SPSPA (e.g.



Figure 1. Leach's Storm-petrel *Hydrobates leucorhous* individual founded on the vessel's deck on 24 September 2021, c. 87 km from the Saint Peter and Saint Paul Archipelago, Brazil, equatorial Atlantic Ocean. Photos © Danielle Viana

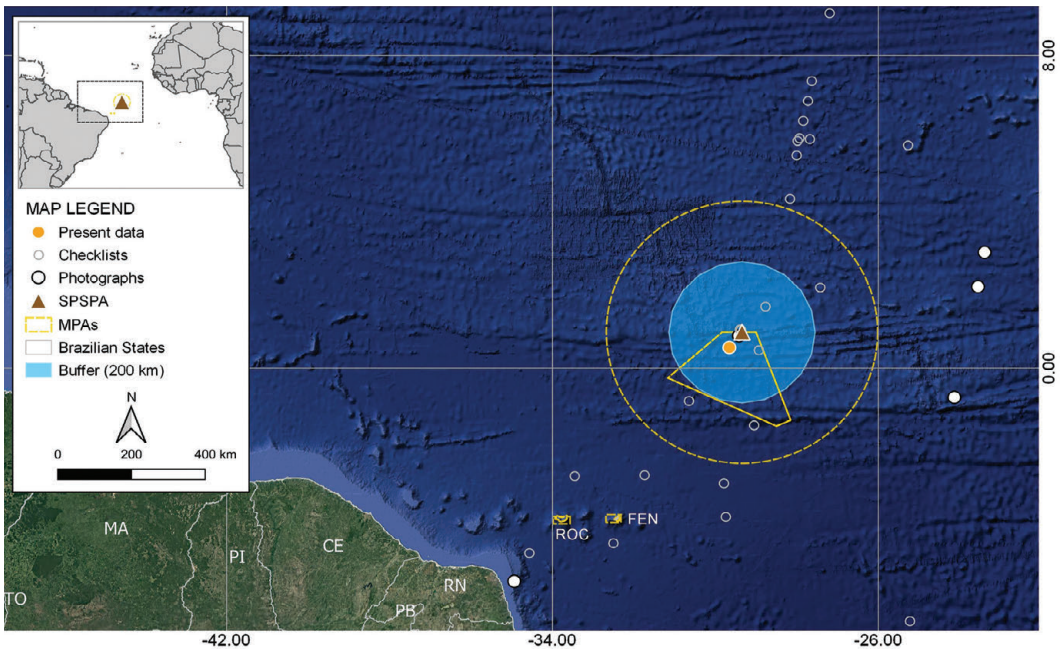


Figure 2. Map of occurrence of Leach's Storm-petrel *Hydrobates leucorhous* near to Saint Peter and Saint Paul Archipelago (SPSPA) from the Atlantic area to mainland Brazil, based on present data and reviewed records. FEN = Fernando de Noronha Archipelago and ROC = Atol das Rocas.

Both & Freitas 2004; Bencke *et al.* 2005; Barbosa Filho & Vooren 2007; Daudt 2019). Indeed, across all Brazilian oceanic islands, there are only a handful of records of Leach's Storm-petrel. Three specimens were collected (American Museum of Natural History, New York) in April 1913 near Atol das Rocas (Figure 2; Murphy 1915), five individuals were photographed on the main island of Fernando de Noronha in June 1999 (Figure 2; Soto & Silva 2001), and an individual was found on a cargo vessel in December 2021 (LPSS, pers. comm). By reviewing citizen-science databases for Leach's Storm-petrel observations around SPSPA, we found a further single species record in 2016 (eBird 2016) in addition to five bird records within 200 km of SPSPA between 1999–2020 that mention the species but lack additional documentation (eBird 2023; Figure 2). Outside this buffer area, there are few

records close to the eastern Brazilian coastline, including near Rio Grande do Norte (RN) state (Lees *et al.* 2015) and to the east of the SPSPA. Thus, we were able to locate only two documented records of Leach's Storm-petrel near SPSPA: the one presented here and the one documented on eBird (2016). Our interpretation is that *H. leucorhous* has rarely been observed near SPSPA, but that it has the potential to be better detected with intensive surveys.

Movement processes such as large-scale migrations and oceanic distributions can explain the occurrence of the Leach's Storm-petrels in equatorial areas. Whilst procellariiform species' distributions have been linked to highly productive waters, mostly in temperate-polar regions (Davies *et al.* 2010), climatic variations (e.g. direction and intensity of wind or currents) can

alter the dynamics of local conditions and improve nutrient availability in lower latitudes (Felicísimo *et al.* 2008; Carlos 2009). Furthermore, Pollet *et al.* (2014) emphasised that Brazilian waters are used extensively for fishing activities, and that fisheries discharge at sea can attract Leach's Storm-petrels.

Despite its small size and isolation, the SPSPA is an important avian stopover site, being one of the only land masses between the North and South Atlantic regions. Although scientific researchers visit this site annually, a specialised team of ornithologists is not always present. Thus, the presence of vagrant, migratory oceanic birds may be understudied (Bencke *et al.* 2005). Barbosa Filho & Vooren (2007) detailed the presence of pelagic avifauna, including Procellariiformes, during shipboard observations between the Brazilian mainland and SPSPA. Therefore, increasing the presence of ornithologists on expeditions and the documentation of species, including via citizen science initiatives, could help to provide better information on bird biogeography, not only for seabird species, but also for Palearctic vagrants and shorebirds (Silva & Olmos 2006; Burgos & Olmos 2013; Whittaker *et al.* 2019).

Although numerous studies now examine the movement ecology of seabirds, we still lack an understanding of the spatial dynamics of many species, particularly outside their breeding seasons (Pollet *et al.* 2019; Berg *et al.* 2019). Given that seabirds have large geographical ranges that span marine ecosystems, reporting records of vagrants, even occasional ones, will help to enhance our understanding of their distributions.

Acknowledgements

We are grateful for the Brazilian Navy crew (NPOc Araguari), specially the SECIRM and PROARCHEPELAGO Program, which provided helpful assistance to the research in the Saint Peter and Saint Paul Archipelago. We thank to P. P. Serafini, L. Bugoni, F. Olmos, R. Araujo, C. C. C. Guitanele for guidance with this work and E. A. Herrera for translating it. This work was also supported by ICMBio, especially CEMAVE and NGI Noronha, and GEF-Mar Project.

References

- Ainley, D. G. 1980. Geographic variation in Leach's Storm-Petrel. *The Auk* 97: 837–853.
- Barbosa Filho, R. C. & Vooren, C. M. 2007. *Censos de aves oceânicas no nordeste do Brasil*. In: Programação e resumos do XV Congresso brasileiro de Ornitologia: 146–147. Porto Alegre, Rio Grande do Sul.
- Barbosa Filho, R. C. & Vooren, C. M. 2010. Abundância, estrutura etária e razão sexual do Atobá-marrom *Sula leucogaster* (Pelecaniformes: Sulidae) no Arquipélago de São Pedro e São Paulo, Brasil. *Revista Brasileira de Ornitologia* 18: 157–163.
- Bencke, G. A., Ott, P. H., Moreno, I. B., Tavares, M. & Caon, G. 2005. Old World birds new to the Brazilian territory recorded in the Archipelago of São Pedro and São Paulo, equatorial Atlantic Ocean. *Ararajuba* 13: 126–129.
- Berg, M., Linnebjerg, J. F., Taylor, G., Ismar-Rebitz, S. M. H., Bell, M., Gaskin, C. P., Åkesson, S. & Rayner, M. J. 2019. Year-round distribution, activity patterns and habitat use of a poorly studied pelagic seabird, the fluttering shearwater *Puffinus gavia*. *PLOS ONE* 14: e0219986. <https://doi.org/10.1371/journal.pone.0219986>
- Both, R. & Freitas, T. O. R. 2004. Aves marinhas no arquipélago de São Pedro e São Paulo. In: Branco, J. O. (eds.) *Aves marinhas e insulares brasileiras: bioecologia e conservação*: 193–212. Editora da UNIVALI, Itajaí.

- Bourne, W. R. P. & Simmons, K. E. L. 1997.** A dark-rumped Leach's Storm-petrel *Oceanodroma leucorhoa* in the South Atlantic. *Sula* 11: 209–216.
- Brooke, M. 2004.** *Albatrosses and Petrels across the World*. Oxford University Press, Oxford.
- Burgos, K. & Olmos, F. 2013.** First record of Corncrake *Crex crex* (Rallidae) for South America. *Revista Brasileira de Ornithologia* 21: 205–208.
- Camphuysen, K. C. J. 2007.** Where two oceans meet: Distribution and offshore interactions of great-winged petrels *Pterodroma macroptera* and Leach's storm petrels *Oceanodroma leucorhoa* off southern Africa. *Journal of Ornithology* 148: 333–346. <https://doi.org/10.1007/s10336-007-0135-3>
- Carlos, C. J. 2009.** Seabird diversity in Brazil: A review. *Sea Swallow* 58:17–46.
- Daudt, N. W. 2019.** *Padrões de distribuição espacial de aves marinhas no Brasil*. Unpublished Masters thesis, Universidade Federal do Rio Grande.
- Davies, R. G., Irlich, U. M., Chown, S. L. & Gaston, K. J. 2010.** Ambient, productive and wind energy, and ocean extent predict global species richness of procellariiform seabirds. *Global Ecology and Biogeography* 19: 98–110. <https://doi.org/10.1111/j.1466-8238.2009.00498.x>
- Deakin, Z., Hansen, E. S., Luxmoore, R., Thomas, R. J., Wood, M. J., Padget, O., Medeiros R., Aitchison, R., Ausden, M., Barnard, R., Booth, V., Hansen, B. R., Hansen, E. A., Hey, J., Hilmarsson, J. O., Hoyer, P., Kirby, W., Luxmoore, A., McDevitt, A.-M., Meulemans, F. N., Moore, P., Sanderson, F., Sigursteinsson, M., Taylor, P. R., Thompson, P., Trotman, D., Wallisch, K., Wallisch, N., Watson D. & Bolton, M. 2021.** Decline of Leach's Storm Petrels *Hydrobates leucorhous* at the largest colonies in the northeast Atlantic. *Seabird* 33: 74–106. <https://doi.org/10.61350/sbj.33.74>
- d'Entremont, K. J. N., Zitske, M. L., Gladwell, A. J., Elliott, N. K., Mauck, R. A. & Ronconi, R. A. 2020.** Breeding population decline and associations with nest site use of Leach's Storm-Petrels on Kent Island, New Brunswick from 2001 to 2018. *Avian Conservation and Ecology* 15: 11. <https://doi.org/10.5751/ACE-01526-150111>
- eBird 2016.** Sat 9 Apr 2016, Rocas São Pedro y São Pablo. (<https://ebird.org/checklist/S28992290>). eBird. Accessed March 2023.
- eBird 2023.** *Hydrobates leucorhous*. (<https://ebird.org/map/lcspet>). eBird. Accessed March 2023. <https://doi.org/10.2307/2844583>
- Edwards, A. & Lubbock, R. 1983.** Marine zoogeography of St. Paul's Rocks. *Journal of Biogeography* 10: 65–72. <https://doi.org/10.2307/2844583>
- Felícísimo, A., Muñoz, J., & González-Solís, J. 2008.** Ocean surface winds drive dynamics of transoceanic aerial movements. *PLOS ONE* 3: e2928. <https://doi.org/10.1371/journal.pone.0002928>
- Flood, R. & Fisher, A. 2013.** *North Atlantic seabirds: Storm-petrels & Bulwer's Petrel*. RRM Consultants, Isles of Scilly.
- Flood, R. L. & Thomas, B. 2007.** Identification of 'black-and-white' storm-petrels of the North Atlantic. *British Birds* 100: 407–442
- Flood, R. L., Lima, R. F., Melo, M., Verbelen, P. & Wagstaff, W. H. 2019.** What is known about the enigmatic Gulf of Guinea band-rumped storm petrels *Hydrobates* cf. *castro*? *Bulletin of the British Ornithologists' Club* 139: 173–186. <https://doi.org/10.25226/bboc.v139i2.2019.a10>
- González-Solís, J., Croxall, J. P., Oro, D. & Ruiz, X. 2007.** Trans-equatorial migration and mixing in the wintering areas of a pelagic seabird. *Frontiers in Ecology and the Environment* 5: 297–301. [https://doi.org/10.1890/1540-9295\(2007\)5\[297:TMAMIT\]2.0.CO;2](https://doi.org/10.1890/1540-9295(2007)5[297:TMAMIT]2.0.CO;2)
- Huntington, C. E., Butler, G. & Mauck, R. A. 1996.** Leach's Storm-Petrel (*Oceanodroma leucorhoa*), version 1.0. In: Poole, A. F. & Gill, F. B. (eds.) *Birds of North America*: 233. The Cornell Lab of Ornithology, Ithaca. <https://doi.org/10.2173/bna.233>
- IUCN 2018.** *Hydrobates leucorhous*. (www.iucnredlist.org/species/132438298/132438484). The IUCN Red List of Threatened Species 2018. Accessed March 2023.
- Lees, A. C., Olmos, F. & Campos, A. 2015.** Here be gadflies: pelagic birding off north-east Brazil. *Neotropical Birding* 17: 11–18.

- Motta, C. L. R., André, I. R. N. & Santos, G. L. 2018. O naturalista Charles Darwin e o arquipélago de São Pedro e São Paulo. In: Oliveira, J. E. L., Viana, D. L. & Souza, M. A. C. (eds.). *Arquipélago de São Pedro e São Paulo: 20 anos de pesquisa*: 12–15. Via Design Publicações, Recife.
- Murphy, R. S. 1915. The Atlantic range of Leach's Petrel (*Oceanodroma leucorhoa* (Vieillot)). *The Auk* 32: 170–173. <https://doi.org/10.2307/4072425>
- Pacheco, J. F., Silveira, L. F., Aleixo, A., Agne, C. E., Bencke, G. A., Bravo, G. A., Brito, G. R. R., Cohn-Haft, M., Maurício, G. N., Naka, L. N., Olmos, F., Posso, S., Lees, A. C., Figueiredo, L. F. A., Carrano, E., Guedes, R. C., Cesari, E., Franz, I., Schunck, F. & Piacentini, V. Q. 2021. Annotated checklist of the birds of Brazil by the Brazilian Ornithological Records Committee – second edition. *Ornithology Research* 29: 94–105. <https://doi.org/10.1007/s43388-021-00058-x>
- Phillips, R. A., Silk, J. R. D., Croxall, J. P., Afanasyev, V. & Bennett, V. J. 2005. Summer Distribution and Migration of Nonbreeding Albatrosses: Individual Consistencies and Implications for Conservation. *Ecology* 86: 2386–2396. <https://doi.org/10.1890/04-1885>
- Pollet, I. L., Bond, A. L., Hedd, A., Huntington, C. E., Butler, R. G. & Mauck, R. 2021. Leach's Storm-Petrel (*Hydrobates leucorhous*). In: *Birds of the World*. The Cornell Lab of Ornithology, Ithaca. <https://doi.org/10.2173/bow.lcspet.01.1>
- Pollet, I. L., Hedd, A., Taylor, P. D., Montevecchi, W. A. & Shutler, D. 2014. Migratory movements and wintering areas of Leach's Storm-petrels tracked using geolocators. *Journal of Field Ornithology* 85: 321–328. <https://doi.org/10.1111/jof.12071>
- Pollet, I. L., Ronconi, R. A., Leonard, M. L. & Shutler, D. 2019. Migration routes and stopover areas of Leach's Storm Petrels *Oceanodroma leucorhoa*. *Marine Ornithology* 47: 55–65.
- Pollet, I. L., & Shutler, D. 2018. Leach's storm petrel *Oceanodroma leucorhoa* population trends on Bon Portage Island, Canada. *Seabird* 31: 75–83. <https://doi.org/10.61350/sbj.31.75>
- Silva, R. S. & Olmos, F. 2006. Noteworthy bird records from Fernando de Noronha, northeastern Brazil. *Revista Brasileira de Ornitologia* 14: 470–474.
- Soto, J. M. R. & Silva, J. R. 2001. *Novos registros de aves para o arquipélago de Fernando de Noronha, Brasil*. In: Resumos do IX Congresso Brasileiro de Ornitologia: 317–372, Curitiba, Paraná.
- Taylor, R. S., Bolton, M., Beard, A., Birt, T., Deane-Coe, P., Raine, A., González-Solís, J., Laughed, S. C. & Friesen, V. L. 2019. Cryptic species and independent origins of allochronic populations within a seabird species complex (*Hydrobates* spp.). *Molecular Phylogenetics and Evolution* 139: 106552. <https://doi.org/10.1016/j.jympev.2019.106552>
- Underhill, L. G., Crawford, R. J. M. & Camphuysen, C. J. 2002. Leach's storm petrels *Oceanodroma leucorhoa* off southern Africa: breeding and migratory status, and measurements and mass of the breeding population. *Transactions of the Royal Society of South Africa* 57: 43–46. <https://doi.org/10.1080/00359190209520526>
- Veit, R. R., Whitehouse, M. J. & Prince, P. A. 1996. Sighting of a Leach's Storm-Petrel *Oceanodroma leucorhoa* near the Antarctic Polar Front. *Marine Ornithology* 24: 41–42.
- Viana, D. F., Hazin, F. H. V., Humber, A. A., Nunes, D. M. & Viana, D. L. 2015. Fisheries in the Saint Peter and Saint Paul Archipelago: 13 years of monitoring. *Boletim do Instituto de Pesca*: 239–248.
- Viana, D. L., Hazin, F. H. V., Nunes, D. M., Carvalho, F. C., Veras, D. & Travassos, P. E. 2008. The wahoo *Acanthocybium solandri* fishery in the vicinity of Saint Peter and Saint Paul Archipelago, Brazil, from 1998 to 2006. *Collective Volume of Scientific Papers – International Commission for the Conservation of Atlantic Tunas* 62: 1662–1670.
- Whittaker, A., Silva, J. P. F., Lucio, B. & Kirwan, G. M. 2019. Old World vagrants on Fernando de Noronha, including two additions to the Brazilian avifauna, and predictions for potential future Palearctic vagrants. *Bulletin of the British Ornithologists' Club* 139: 189–204. <https://doi.org/10.25226/bboc.v139i3.2019.a2>



Leach's Petrel *Hydrobates leucorhous*,
Rio Grande do Norte, Brazil, 25 January 2015.
© Alexander Lees