



Short note | Nota breve

Possible breeding of Cape Verde storm-petrel *Oceanodroma jabejabe* (Bocage, 1875) on Santa Luzia, Cape Verde Islands

Nuno Oliveira, Jailson Oliveira, Tommy Melo, José Melo & Pedro Luís Geraldes

Santa Luzia (18°52', 18°60'N; 24°41', 24°48'W) is the smallest island (35 km²) in the Cape Verde archipelago¹. Although uninhabited today, two families of goatherds lived on Santa Luzia until the mid-1960s. In 1990, together with the nearby islets of Branco and Raso, Santa Luzia was designated a Nature Reserve by law. The island is extremely arid and barren, with hills, stony plains and sand-dunes being the main features. The highest elevation reaches 395 m a.s.l. The vegetation is characterized by a single floristic zone (Duarte *et al.* 2008), dominated by drought resistant species such as *Cistace phelipaea*, *Polycarpaea nivea*, *Zygophyllum simplex*, *Heliotropium ramisissimum*, *Frankenia ericifolia* and *Euphorbia tuckeyana* (Schleich & Wuttke 1983, Dinis & Matos 1994, Sánchez Pinto *et al.* 2005). The northern shoreline of the island is characterized by steep cliffs, 10-30 m in height. The remaining shore consists of sandy beaches in the southern part and rocky beaches along the western, north-eastern and eastern coast of the island (Dinis & Matos 1994).

At present, no seabirds are known to breed on Santa Luzia nor are there confirmed records from historical times. However, as is still the case at the nearby islets of Raso and Branco, considerable numbers must have bred in Santa Luzia in the past, witness the extended bonebeds (of as yet unidentified taxa) that exist on the island (cf. Mateo 2012: 75). Whether these seabird colonies disappeared due to human depredation or already withered in prehistorical times, as has been the case on other islands in the Cape Verde archipelago (cf. Boessneck & Kinzelbach 1993), is still to be determined.

Cape Verde storm-petrel *Oceanodroma jabejabe* (Bocage, 1875) is a small seabird endemic to the Cape Verde archipelago. Based on diagnostic differences in vocalizations (Bolton 2007) and molecular data (Friesen *et al.* 2007) compared to other Atlantic *Oceanodroma* storm-petrels, it was recently recognized as a diagnosably distinct lineage within the *Oceanodroma castro*-complex (Sangster *et al.* 2012). Cape Verde storm-petrel is known to breed on the islets of Cima (one of the Rombo islets), Branco, Raso and perhaps still on the islets of Pássaros and Curral Velho, both off Boa Vista (Hazevoet 1995). Possibly, it also breeds in small numbers along the coasts of some of the main islands (Hazevoet 1994, 1995). Remains of several Cape Verde storm-petrels were recently found on the cliffs at Baía do Inferno (aka Baía de Santa Clara) on the south-western coast of Santiago (S. Martins *in litt.*). The total population of Cape Verde storm-petrel was tentatively estimated at *ca.* 1,000 pairs (Hazevoet 1994, 1995). Cliff holes and burrows under rocks close to the shoreline are the preferred breeding habitat, often in the company of other breeding procellariids. Breeding sites are visited only at night during the breeding season, with birds calling in flight as well as in their burrows, as is typical of the breeding behaviour of many petrel species (Warham 1990).

During the nights of 12 and 13 August 2012, we inspected the only area deemed to have nesting habitat suitable for Cape Verde storm-petrel on Santa Luza. Eight listening points were selected along the north-western coast of the island in order to try and detect calling Cape

¹ In Cape Verde, a distinction is made between islands (*ilhas*) and islets (*ilhéus*).



Fig. 1. Map of Santa Luzia, with listening points selected to detect calling activity of Cape Verde storm-petrel *Oceanodroma jabejabe*, 12-13 August 2012. Inset: Cape Verde Islands, indicating the position of Santa Luzia within the archipelago.

Point	Date	Start time	Call rate
P1	7/12/2012	20:25	0
P2	7/12/2012	20:40	0
P3	7/12/2012	21:20	0
P4	7/12/2012	21:50	4
P5	7/13/2012	20:30	0
P6	7/13/2012	20:50	0
P7	7/13/2012	21:20	0
P8	7/13/2012	21:50	0

Table 1. Dates and time spent at listening points in Santa Luzia, Cape Verde Islands, in order to record Cape Verde storm-petrel *Oceanodroma jabejabe* calling activity. Each listening point was sampled during 15 minutes. Call rate was estimated as number of calls per hour.

Verde storm-petrels (Fig. 1). On each night, four different listening points were surveyed for 15 minutes each. Call rate was assessed as the number of detected calls per hour (Bolton 2007). Surveys were undertaken during the first three hours after sunset (Table 1), as storm-petrels call more actively during this period (Bolton 2007). Complementary ground searches were performed along the cliffs in the same area during daytime. Cape Verde storm-petrel calling activity was

only detected at listening point P4, with a call rate of 4 calls/hour. During the ground search, six rocky fissures with signs of nesting were detected along the cliffs. In one, a few feathers were found and in another two feathers with the characteristic storm-petrel smell. Near listening point P1, the wings of at least six adult Cape Verde storm-petrels were found. In a crevice *ca.* 20 m from P6, a full-grown bird was found. Its posture suggested that it was incubating an egg

or brooding a small chick, but the crevice was too deep to examine the bird or the contents of the cavity directly and we could not rule out the possibility that it was a fully-grown nestling which had shed all down feathers. During the last daily ground search, 123 wings of Cape Verde storm-petrels were found within an area of 20 m² at the top of the cliff close to the P2 listening point. Some feathers were quite fresh and clean, while others were dirty and seemed to be more than a month old. Nearby this area, at a distance of less than 50 m, a feral cat *Felis catus* was observed for about 5 minutes, before it hid under a pile of rocks.

The feathers found in crevices and the presence of a possible nesting bird strongly point to the possibility of Cape Verde storm-petrels attempting to breed at the cliffs of Santa Luzia. Moreover, the discovery of wings of a large number of adults, presumably preyed by cats, suggests that birds are coming to land, where they are vulnerable to predation. It seems quite possible that these birds were attracted by calling birds occupying nest crevices that were not accessible during our survey.

The nearest known Cape Verde storm-petrel breeding site is at Branco islet, *ca.* 10 km to the east of Santa Luzia. Although the islets of Raso and – to a lesser degree – Branco have been researched quite regularly during the past decade, Santa Luzia was seldom visited by seabird experts, probably partly because of its larger size and the effort needed to prospect all potential breeding areas. Storm-petrel nests are difficult to locate and the limited time researchers have spent in the island could explain the absence of breeding records so far.

Cats were probably brought to Santa Luzia during the 18th century, when the first goatherds settled there. The cat population is nowadays

estimated to be 20-40 individuals (N. Oliveira unpublished data). Domestic cats have been introduced to many islands around the world and have often had a dramatic impact on the original wildlife (Medina *et al.* 2011, Nogales *et al.* 2013). Although no evidence of Cape Verde storm-petrel as a prey item was found in recent studies of feral cat diet on Santa Luzia (Donald *et al.* 2005, Medina *et al.* 2012), feral cats are known to prey on seabirds elsewhere, having caused the extinction of several populations (e.g. Wolf *et al.* 2006). They have been identified as the major predator even when multiple invasive mammal species are present (Hervías *et al.* 2013). When colonies of storm-petrels are extirpated, birds often do not return to their former breeding sites as a result of a combination of social constraints (Podolsky & Kress 1989) and demographic factors (Warham 1990). Urgent action is needed in order to evaluate cat predation on Cape Verde storm-petrel in Santa Luzia and effective measures are needed to mitigate the impact of feral cats. Further research should aim at improving our knowledge of this potential population in terms of number of breeding pairs, spatial distribution of nests, population trends and main threats. As the breeding season of Cape Verde storm-petrel is protracted, with nesting activity recorded from October to June (Hazevoet 1995), possibly extending into August (this study), multiple surveys should be carried out at different times of the year.

We wish to thank Mark Bolton for helpfully commenting on an earlier draft of this note. Samir Martins kindly informed us about the recent find of *Oceanodroma* remains on Santiago. We also thank Cornelis Hazevoet for providing editorial help.

REFERENCES

- Boessneck, J. & R. Kinzelbach, 1993. Ein prä-historischer Brutplatz von Seevögeln auf der Insel Sal (Kapverden). *Journal für Ornithologie* 134: 245-271.
- Bolton, M., 2007. Playback experiments indicate absence of vocal recognition among temporally and geographically separated populations of Madeiran storm-petrels *Oceanodroma castro*. *Ibis* 149: 255-263.
- Diniz, A.C. & G.C. de Matos, 1994. Carta de zonagem agro-ecológica e da vegetação de Cabo Verde. VII – Ilha de Santa Luzia. Garcia de Orta, Sér. Bot., 12: 101-120.
- Donald, P.F., M. de L. Brooke, M.R. Bolton, R. Taylor, C.E. Wells, T. Marlow & S.M. Hille, 2005. Status of Raso lark *Alauda razae* in 2003, with further notes on sex ratio, behaviour and conservation. *Bird Conservation International* 15: 165-172.
- Duarte, M.C., F. Rego, M.M. Romeiras & I. Moreira, 2008. Plant species richness in the Cape Verde Islands – eco-geographical

- determinants. *Biodiversity and Conservation* 17: 453-466.
- Friesen, V.L., A.L. Smith, E. Gómez-Díaz, M. Bolton, R.W. Furness, J. González-Solis & L.R. Monteiro, 2007. Sympatric speciation by allochrony in a seabird. *Proceedings of the National Academy of Science of the USA* 104: 18589-18594.
- Hazevoet, C.J., 1994. Status and conservation of seabirds in the Cape Verde Islands. Pp. 279-293 in: D.N. Nettleship, J. Burger & M. Gochfeld (eds.), *Seabirds on islands: threats, case studies, and action plans*. BirdLife Conservation Series No. 1. BirdLife International, Cambridge, U.K.
- Hazevoet, C.J., 1995. The birds of the Cape Verde Islands. BOU Check-list 13. British Ornithologists' Union, Tring. 192 pp.
- Hervías, S., A. Henriques, N. Oliveira, T. Pipa, H. Cowen, J.A. Ramos, M. Nogales, P. Geraldés, C. Silva, R. Ruiz de Ybáñez & S. Opperl, 2013. Studying the effects of multiple invasive mammals on Cory's shearwater nest survival. *Biological Invasions* 15: 143-155.
- Mateo, J.A., 2012. Las trágicas crónicas de la lisa gigante de Cabo Verde. *Makaronesia* 14: 64-88.
- Medina, F.M., E. Bonnaud, E. Vidal, B.R. Tershy, E.S. Zavaleta, C.J. Donlan, B.S. Keitt, M. Le Corre, S.V. Horwath & M. Nogales, 2011. A global review of the impacts of invasive cats on island endangered vertebrates. *Global Change Biology* 17: 3503-3510.
- Medina, F.M., P. Oliveira, P. Geraldés, J. Melo & N. Barros, 2012. Diet of feral cats *Felis catus* L., 1758 on Santa Luzia, Cape Verde Islands. *Zoologia Caboverdiana* 3: 67-73.
- Nogales, M., E. Vidal, F.M. Medina, E. Bonnaud, B.R. Tershy, K.J. Campbell & E.S. Zavaleta, 2013. Feral cats and biodiversity conservation: the urgent prioritization of island management. *BioScience* 63: 804-810.
- Podolsky, R.H. & S.W. Kress, 1989. Factors affecting colony formation in Leach's storm-petrel. *Auk* 106: 332-336.
- Sánchez Pinto, L., M.L. Rodríguez, S. Rodríguez, K. Martín, A. Cabrera & M.C. Marrero, 2005. Pteridophyta, Spermatophyta. Pp. 38-57 in: M. Arechavaleta, N. Zurita, M.C. Marrero & J.L. Martín (eds.), *Lista preliminar de especies silvestres de Cabo Verde (hongos, plantas y animales terrestres)*. Consejería de Medio Ambiente y Ordenación Territorial, Gobierno de Canarias, Santa Cruz de Tenerife.
- Sangster, G., J.M. Collinson, P.A. Crochet, A.G. Knox, D.T. Parkin & S.C. Votier, 2012. Taxonomic recommendations for British birds: eighth report. *Ibis* 154: 874-883.
- Schleich, H.H. & M. Wuttke, 1983. Die Kapverdischen Eilande Santa Luzia, Branco und Razo – ein Reisebericht. *Natur und Museum* 113: 33-44.
- Warham, J., 1990. The petrels: their ecology and breeding systems. Academic Press, San Diego & London. 440 pp.
- Wolf, S., B.S. Keitt, A. Aguirre-Munõz, B.R. Tershy, E. Palacios & D.A. Croll, 2006. Transboundary seabird conservation in an important North American marine ecoregion. *Environmental Conservation* 33: 294-305.

Nuno Oliveira & Pedro Luís Geraldés, Sociedade Portuguesa para o Estudo das Aves, Avenida João Crisóstomo 18-4º dto, 1000-179 Lisboa, Portugal; nuno.oliveira@spea.pt
Jailson Oliveira, Tommy Melo & José Melo, Biosfera I, Caixa Postal 233, Mindelo, São Vicente, Republic of Cape Verde

Received 28 October 2013
Revised 14 December 2013
Accepted 19 December 2013